40p

POPULAR Computing WEEKLY

3-9 May 1984 Vol 3 No 18

Education special — page 20

BRITAIN'S BEST-SELLING MICRO WEEKLY



STAR GAME
Solitaire on Dragon
See page 10

News Desk

Philips set the standards

PHILIPS is negotiating with the French computer manufacturer Thomson to develop a joint standard for European home and business microcomputers

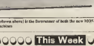
If agreement can be reached between the two companies then the new Thomson machine — the MO5, announced last week, will become the home computer (eight-bit) standard for the two companies It is hoped that Philips will then begin manufacture of the MO5, under licence from Thomson

The two firms hope for a long term relationship in which a business (16-bit) joint standard could also be established

Thomson also announced a second home machine last week — the TO7 70 Both the MO5 and the TO7 70 are developments of Thomson's existing home micro, the TO7, which will now be discontinued All of the machines are based on the 6809E microprocessor chip

The MO5 is priced at 2390F (around £200) It has 48K Ram a moving-key keyboard and a single keyword entry Basic included in Rom It will

continued on page 5



The Thomson TO7 (shown above) is the forerunner of both the new MO5 and the TO7 70 machines

Commodore presents the C16

HAVING abandoned plans to sell its 116 machine in Europe Commodore has announced a new low cost machine — to be called the C16

The C16 is intended as a competitor for the Sinclair Spectrum In appearance it resembles the Commodore 64 using the same case and keyboard Inside, however, it is more reminiscent of the now dropped 116 It uses the upgraded 6502 processor chip — the 7501 and has 16K Ram and 32K Rom Included in the Rom is Commodore Basic 3 5

Screen display is 40 x 25 characters Up to 121 colours can be selected with a graphics (not colour) resolution of 320 x 200 pixels The C16 has twin sound generators — either two music or one music and one white noise channel

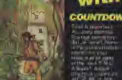
The new machine will be shown at this year's Commodore Computer Show held from June 7 to 9 at Novotel (formerly the Cunard Hotel) in London

Commodore's other new machine, the 264 — now renamed the Commodore Plus 4 — will also be at the show.

This Week

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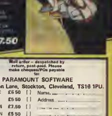
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3-9 May 1984 Vol 3 No 18

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How to submit articles
Articles which are submitted for publication should not be more than 3 000 words long. The articles and any accompanying programs should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

Editorial

Silicon Valley enjoys an enviable reputation, both in the US and in the rest of the world It is a haven for bright young entrepreneurs, budding venture capitalists and engineers of all description

The 25 mile strip, which runs just south of San Francisco from Palo Alto to San Jose, is littered with famous names Atari, Apple, IBM, Hewlett-Packard, Intel and National Semiconductor are just a few of the companies which rub shoulders in the high-tech 'Valley'

Unfortunately there is no exact UK equivalent Cambridge is perhaps the closest to a 'Silicon City', with companies such as Acorn, Sinclair and Camputers But, manufacturing and assembly plants tend to be located further afield, eg, Timex in Dundee.

Software companies are distributed throughout the country — Psion in London, Quicksilva in Southampton, Bug-Byte, Imagine and Software Projects in Liverpool

Even Sir Clive Sinclair's much vaunted Metalab will not cover quite the same range of high technology industries as exist in Silicon Valley

Acorn, however, has made the best of both worlds by opening its own research facility in Silicon Valley (*PCW* 1-7 March) Unfortunately Acorn is unwilling to talk about its latest US venture Perhaps Acorn is afraid of Silicon Moles?

● *PCW* goes up in price from 35p to 40p today This is the first increase in two years

Next Thursday

Next week s star game is Othello — for 16/48K Spectrum by Paul Reynolds

Optical discs from Acorn and BSR

ACORN Computers and audio products company BSR International have set up a partnership to develop optical discs for computers

The joint venture company called Optical Information Systems will produce the disc drives which read the stored information in a similar way to present video disc players by means of a laser

"This is an up and coming technology," said Acorn director Andy Hopper "At the moment it is a speculative venture but if it works well, we'll certainly start taking it seriously "

The advantage of an optical disc system over a more conventional magnetic disc is its considerably enhanced storage capacity Development of magnetic media has now almost reached its limit and manufacturers are looking to other types of storage for the next generation of disc units

Production of the optical drive is expected to start at the beginning of 1985 in Hong Kong, but the optical discs themselves will probably not be available for a couple of years

Philips

◄ continued from page 1

run both cassette and Rom cartridge software

The TO7 70 is more expensive at 3500F (£300) It has 64K Ram — expandable to 128K, a professional quality keyboard and a built-in quality keyboard and a built-in,cassette player Unlike the MO5, Basic must be loaded from cassette Also unlike the MO5, the machine is software compatible with its predecessor the TO7

The MO5 is to play a similar role in France as the BBC machine did over here It will be used as the basis for a tv series to be broadcast nationally in October By then it is hoped some 40,000 machines will have been manufactured

Philips is very keen to make an entry into the home computer market In recent months its name has been linked with two other companies in connection with possible joint ventures — Atari and Microsoft (for an MSX machine)

A strategic Empire

EMPIRES is a strategy game with a difference, for the 48K Spectrum.

The game is for four Spectrum players, and comes complete with four cassettes Three users actually play the game, the fourth acting as an umpire.

The three are each leaders of a galactic race whose aim is to wipe out the other races to gain supreme control Each plays separately and, after each move, players return their saved data to the umpire The moves are then analysed by the umpire's program and the data for the new positions is then saved and returned to the players for the next move

Empires costs £19 95 Details from Imperial Software, 153 Churchill Road, Parkstone, Poole, Dorset.

A portable Apple

APPLE has introduced a portable version of the longstanding IIe computer

The new version will be called the IIc, and is aimed at 'serious home users' Apple is keen to distinguish these from those who primarily play video games

The IIc's software will be compatible with that of the IIe in that it will be able to use about 90 per cent of its software

The IIc will cost $1,295 (about £900) — this includes a floppy disc drive in addition to the micro itself It has 128K of memory, twice that of the IIe

As well as the machine itself, Apple has also launched a set of peripherals for the machine — a colour printer priced at $299 (£212), a high-resolution black-and-white monitor for 80 column display, a mouse cursor device, external disc drive and a carrying case.

Monopoly money for Leisure

LEISURE Genius, the computer board-game specialist has signed an agreement with Waddington to produce a micro version of *Monopoly*

Peter Deutsch

"Our initial plans are to produce the game for Commodore 64 and Spectrum," said Peter Deutsch, managing director of Leisure Genius. "But the Amstrad seems to be making a big impact, and Advance machine sounds excellent too

"We would expect to see a *Monopoly* program out in July, although it's very early days yet At the moment we're concentrating on getting our *Scrabble*, *Cluedo* and *Master mind* games for Commodore 64 in the shops for May "

The onus for protecting *Monopoly* from unlicensed versions of the game still falls ultimately to Waddington which has in the past taken action against a number of companies

Who's for tennis?

PSION'S next release will be *Tennis* for the 48K Spectrum scheduled for late-May, well in time for Wimbledon

You play against the computer and view the game from your end of the court facing the net and your computer generated opponent

Commented Psion's managing director David Potter, "I predict that nobody will be watching Wimbledon this year — they'll all be playing Psion *Tennis*!"

Modulator design for ABM

THE Acorn Business Machine — Acorn's entry into the business micro market — will feature a modular design much like the BBC machine

"The ABM will almost certainly have a number of dual processor options" explained an Acorn spokesman

A 6502 second processor option is planned "The ABM will be able to be configured in such a way that it will run BBC Basic That may not be its normal mode of operation but the potential for compatibility with BBC micro software will be there for those who want it

The ABM is expected to be announced later this year

Queen's award for Acorn

A Queen's Award for Technological Achievement has been won by Acorn Computers, for its BBC microcomputer system

The Award praises the "advanced design" and "innovative features" of the BBC micro

Chris Curry, managing director of Acorn Computers, said, "It is a special honour for Acorn "

QL reaches the outside world

FIRST deliveries of the QL should by now have reached some customers.

The initial batch of machines — around 1000 — should be going out all this week and it is hoped that all customers who received letters from Sinclair indicating an April delivery should get their QLs before the weekend

The number of machines being sent out will steadily increase and Sinclair hopes to clear its current backlog of more than 13,000 orders by mid-July

Two working QL machines made an appearance at the 11th ZX Microfair held last weekend at Alexandra Palace attracting big crowds

● *PCW*'s QL order Week 15. Still no sign

Correction

● *Pengwyn* for the Amstrad micro is being developed by Postern The game was incorrectly attributed to Ocean in *PCW*, April 19



METAGALACTIC LLAMAS BATTLE AT THE EDGE OF TIME
LASER ZONE
MATRIX
Available for Commodore 64 £7.50 and VIC-20 £6.
HOVER BOVVER
ATTACK OF THE MUTANT CAMELS
Llamasoft

Letters

Satisfied customer

My son takes your magazine *Popular Computing Weekly* and has done so since it was first published

In January of this year he experienced some difficulty with his ZX81 Printer, using it with an adaptor link up to his BBC Computer After approaching various electronic engineers with no satisfaction from any, my son asked me to get in touch with a company advertised in your magazine Advanced Digital Systems Ltd, of Portsmouth which supplied the adaptor

This company deserves to get on the after sales service (re the adaptor) plus advice and repairs done on a ZX Power Pack ZX Printer and 16K Ram Pack (Sinclair did not even reply to letters) were attended to without hesitation Advanced Digital Systems Ltd acted above and beyond the call of duty — Well Done!

I would appreciate it if you would print this on your letters page maybe somebody else might be glad to know of a company who, without doubt, goes to any length to satisfy the customer

Marcus Ley
43 Somers Road
North Reddish
Stockport SK5 6SL

Word package

I am writing in answer to S Guerqueb's letter in Peek and Poke in issue no 15 Vol 3 of *Popular Computing Weekly*, regarding the use of a Brother personal printer/typewriter with a Spectrum It is in fact possible to put together a word processing package using the Brother EP22 printer/typewriter, a Tasman RS232 interface and Tasword Two for around two hundred pounds

The Brother EP22 uses two ways of printing, on plain paper using ink cassettes, or on thermal paper At the moment I do not know the cost of replacement cassettes or thermal paper To save thermal A4 paper supplied, I have used the thermal paper from an Alphacom 32 printer and this works fine The EP22 has many excellent features besides the fact that it can double as a printer and is extremely portable, working off batteries or mains

To connect it to a Spectrum all that is required is a Tasman RS232 interface, which plugs straight into the computer and has a lead which connects to the Brother EP22 Software is supplied to configure to various printers and the interface works well with Tasword Two Word processor

The RS232 Interface and Tasword Two are available from Tasman Software and the Brother EP22 is available from Micro Research Livingstone

Iain Ferguson
18 Gorsebank
Ladywell
Livingston
West Lothian

Screen clearance

I own a Vic 20 and I have two programming tips for your readers 1) To prevent people from breaking into your programs, *Poke 788 194* followed by *Poke 808 100*

2) When saving programs if you type *Save program name* on loading the screen will be cleared when the program is found, thus giving a professional effect (the symbol before 'program name' is obtained by *Shift/Clr)*

Carl Pickin
Lenvens
Tunstal Road
Knypersley
Stoke-on Trent

A strange anomaly

I am writing to report a strange anomaly concerning the loading of tapes on my ZX Spectrum (or, it seems, any micro with an external power supply)

A friend informed me of problems he had loading games into his Commodore 64 and he found that by placing the power supply away from the tv set and not next to it as he had done the tapes would load with no problem As I had much the same set up, I tried the same procedure and found that *Valhalla*, which I had no end of trouble getting to load, went in first time

The only explanation I can think of may be that some sort of feedback or interference is affecting the power supply and forming a loop back to the computer

I hope that this information is of some use to anyone having loading problems

D McRiner
Dhahran
Saudi Arabia

Compatible programs

I would like to take this opportunity to inform your readers that there are two types of ZX Spectrum software

a) That which is compatible with the ZX Microdrive

b) That which is *not*, ie that which requires complex manipulation of code to overcome the incompatibility obstacle

Please advise your software reviewers to bear the above in mind when reviewing new programs within the columns of your excellent weekly

There must be thousands of ZX Spectrum users who no longer run incompatible programs in favour of programs that are compatible, ie, those which may be *Saved* and *Loaded* onto Microdrive cartridges

Likewise, there must be vast quantities of unsold material due to lack of information in compatibility and the attendant risk of a purchase being incompatible

In the naive hope that this letter will stimulate reaction I hope that you will prompt and advise your advertisers to comment on compatibility

David Lowe
31 Hill View Road
Rotherham

Biological theme

Please could you send me any information on whether there is any software firm that offers a biology game I ask because my biology project for the term is 'Design a biological game' for which I thought a computer game would be suitable

My computer is a Sinclair Spectrum (48K) However, my school also has Apple IIs and BBC micros

I look forward to hearing from you

Timothy Andrews
Inver Cottage
Maple Walk
Cooden
Sussex

The most obvious game would be *Life*, which simulates the growth of cells over a number of generations. Numerous listings have been published in various computer magazines over the past two years

Missing hex loader

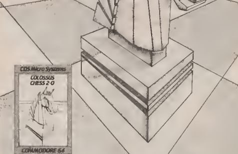
I have a question about an article in your magazine dated 12-18 April On pages 26-27 you have a hex code listing to make your spectrum simulate an organ — something I have been looking for for a long time

However the notes tell us to type in the hex loader — where is it? As I am new to machine code I do not know how to poke it in Can you help?

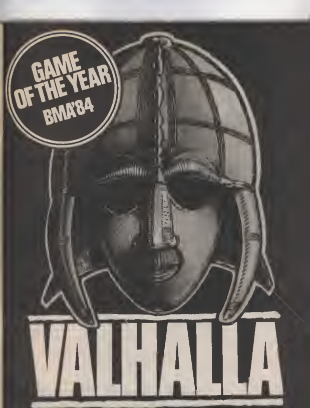
Gary Joyce
48 Princess Drive
Sandbach
Cheshire
CW11 9BP

The missing hex loader seems to have baffled quite a few people. In fact Mark Lawrence's series, of which the Organ was only part, utilises the same hex loader for every section — the one printed in the first part, issue dated 5-11 April.





CDS Micro Systems
COLOSSUS
CHESS 2·0
COMMODORE 64


GAME OF THE YEAR
BMA'84
VALHALLA
SOON FOR COMMODORE 64



Solitaire

A new game for Dragon 32 by J D Batemen

This game is played in the same way as the standard Solitaire with pegs or marbles. Each piece can be jumped over an adjacent one in an empty hole immediately beyond. The piece that is jumped over is then removed from the board. The object of the game is to finish with just one piece remaining in the centre space.

Program Notes

All lower case letters are inverse characters.
The colours used are not suitable for a B/W TV but can be easily changed for ones with a better contrast.
All peg positions, vacant holes, etc are stored in the various Data lines.

Lines 120-280	Set up the board
Lines 310-640	Input of (moving) peg positions.
Line 280	Checks for valid peg location
Lines 680-710	Input direction
Lines 810-1010	Show a solution
Lines 1040-1130	Instructions
Lines 1160-1320	Check for and print valid moves.
Line 1330	Checks if final move leaves peg in centre hole

```
10 '
20 '         * SOLITAIRE *
30 '              FOR
40 '          DRAGON 32 *
50 '         J.D.BATEMAN
60 '         * 10/1/84 *
70 '
80 CLS PRINT@32, [illegible]
90 A$=INKEY$:IF A$= THEN90
100 IF A$= [illegible] THEN 1040
110 CLS0
120 PRINT@10 SOLITAIRE> ,
130 FOR X=89 TO 99 PRINT@X,CHR$(255). NEXT
140 FOR Y=101 TO 389 STEP 32:PRINT@Y CHR
$(255). NEXT
150 FOR Z=121 TO 409 STEP 32 PRINT@Z CHR
$(255) NEXT
160 FOR W=421 TO 441 PRINT@W,CHR$(255),
NEXT
170 PRINT@168, . PRINT@198 . PRINT@
230 . PRINT@262, . PRINT@294, . P
RINT@326, . PRINT@358, .
[illegible]
240 REMARK [illegible]
250 PRINT@[illegible]
260 NEXT
270 PRINT@[illegible] IF [illegible] THEN [illegible]
280 PRINT@[illegible] PEG
290 INPUT P$
300 SP=0
310 IF P$="0" THEN 240
320 IF P$="A3" OR P$="3A" THEN SP=173
330 IF P$="A4" OR P$="4A" THEN SP=175
340 IF P$="A5" OR P$="5A" THEN SP=177
350 IF P$="B3" OR P$="3B" THEN SP=205
360 IF P$="B4" OR P$="4B" THEN SP=207
370 IF [illegible] OR P$="[illegible]" THEN SP=209
```



```
... THEN 1330
... PRESS ARROW"
A$=INKEY$ IF A$="" THEN 670
680 IF A$=CHR$(8) THEN GOSUB1160
690 IF A$=CHR$(10) THEN GOSUB 1200
700 IF A$=CHR$(94) THEN GOSUB 1240
710 IF A$=CHR$(9) THEN GOSUB 1280
720 FOR X=440 TO 479 PRINT@X,CHR$(224)
NEXT
730 GOTO 270
740 FOR B=440 TO 479 PRINT@B,CHR$(224
NEXT
750 PRINT@450 "SOLUTION Y/N ".
760 A$=INKEY$ IF A$="" THEN760
770 IF A$="N" THEN 810
780 FORB=450 TO 489 PRINT@B CHR$(224): NEXT
790 GOTO1060
800 DATA1 125 177,205,207 209 233,235,
23 ,239,241 .43 245,265,267,269 273,275
277,297 .99,301 303 305,307 309,333,335,
337,305 36 ,369
810 PRINT@455 SOLUTION :
820 B$=CHR$( 24 +CHR$(.24)+CHR$(224)+CHR
$(224)
830 PRINT@155 B$ PRINT@187 B$ PRINT@21
9,B$
840 RESTORE
850 PRINT@271 CHR$(150)
860 DIM( .)
870 FOR I=1 TO 3,
880 READ B(I
890 PRINT@B(I) CHR$(204)
900 NEXT I
910 F R D=0 1 100 NEX D
920 DIMX( ) DIMY( ) DIMZ(31)
930 FOR I=1TO31
940 READX(I) Y(I ,Z(I)
950 PRINT@X I), HR$(100 FOR D=0 TO 80
NEXT PRINT@Y(I) CHR$(100); FOR D=0 TO 80
 NEXT PRINT@Z(I),CHR$(100) FOR F=0 TO
80:NEXT
960 PRINT@X(I) HR$(150) PRINT@Y(I) CHR
$(204) PRINT@Z I CHR$(150)
970 FORD=1 TO 1550 NEXTD
980 NEXTI
990 FOR D=0 TO 1000 NEXT
1000 (C) I O 0 15 1 84 (C)
1010 GOTO1360
1020 DATA207 271 239.243 239 241 17 ,241
,209 223 209 241 173 75 177 241 209
,337,273 305 309 305,307 302 307 305,.45
,305 27 305,305,307 255,303,301 305,301
,333,265 33 301 305 365 367
1030 DATA305,301,333,205,209,237,233,237
```

```
209,
303 238
303 301,
271 241, 305,271 301
1040 CLS PR PIECE IS JUMP
ED OVER AN AND AN EMPTY
HOLE IMMEDIATE THE PIECE BEI
NG JUMPED THE HAS BEEN JUMPED
 OVER IS REMOVED BOARD
1050 PRINT:PRINT"PERMITTED MOVES ARE UP,
DOWN,LEFTOR RIGHT THE OBJECT OF THI GAM
EIS TO END UP WITH THE LAST PIECEIN THE
CENTRAL POSITION,
1060 PRINT PRINT   press any key to con
t nue
1070 A$=INKEY$ IF A$="" THEN 1070
1080 CLS PRINT   to move any val d p ec
e PRINT ENTER THE LOCATION OF THAT PIEC
EAND THEN PRESS THE APPROPRIATE  ARROW K
EY
1090 PRINT for example PRINT"  YOU MAY
WISH TO JUMP THE PIECEFROM A3 OVER THE P
IECE IN A4 TO AN EMPTY SPACE AT A5.
1100 PRIN   TYPE IN 4A or A4 PRESS <ENTE
R>,THEN PRESS THE RIGHT ARROW KEY
1110 PRINT IF AT ANY TIME YOU CAN MOVE N
O FURTHUR PRESS Q TO QUIT   PRINT PRINT
"   press any key to cont nue
1120 A$=INKEY$ IF A$=""  THEN 1120
1130 CLS PRINT@193  A CHANCE TO VIEW A S
OLUTION IS OFFERED AFTER PLAY IS FINISHE
D  PRINT PRINT PRINT PRINT    press any
 key to cont nue
1140 A$=INKEY$ IF A$=""  THEN 1140
1150 GO O 110
1160  =PEEK(1024+SP) M=PEEK(1022+SP) N=P
EEK(1020+SP)
1170 IF L=204 AND  M=204 AND  N 150 THEN
1190
1180 GOTO1320
1190 PRINT@SP CHR$(150)  PRINT@SP 2,CHR$
(150)  PRINT@SP 4,CHR$(204)  U=U I RETUR
N
1200 L=PEEK(1024+SP) M=PEEK(1050+SP) N=P
EEK(1088+SP)
1210 IF   204 AND M=204 AND N=150 THEN12
30
1220 GOTO  320
1230 PRINT@SP CHR$(156)  PRINT@SP+32 CHR
$(150)  PRINT@SP+64,CHR$(204 , U=U-1 RET
URN
1240 L=PEEK(1024+SP) M=PEEK(992+SP) N=PE
EK(960+SP
1250 IF   204 AND M=204 AND N 156 THEN12
70
1260 GOTO1320
1270 PRINT@SP CHR$(150)  PRINT@SP 32 CHR
$(150  PRINT@SP 64 CHR$ 204   U U  RET
URN
1280 L PEEK(1024+SP) M=PEEK 1028+SP) N=P
EEK 828+SP)
1290 IF   204 AND M 204 AND N 155 THEN 1
310
1300 GOTO 320
1310 PRINT@SP.CHR$ 156)  PRINT@SP+2 CHR$
 150)  PRINT@SP+4,CHR$(204); U=U I RETUR
N
1320 SOUND 1 5 GOT  720
1330   PEEK( 255) IF I=204 THEN1350
1340 PRINT@449  YOU HAVE GONE WRONG SOME
WHERE   FOR D=0 TO 1000 NEXT GOTO1360
1350 PRINT@449   CONGRATULATIONS YOU GOT
IT RIGHT   FOR D=0 TO 5000 NEXT
1360 C  PRINT@281  TRY AGAIN Y N ?
1370 A$=INKEY$ IF A$=""  THEN 1370
1380 IF A$= I  THEN 1400
1390 END
1400 CL  PRINT@282, PRESS BREAK
1410 PRINT@224   TYPE RUN AND <ENTER> TO
 PLAY
```

Code-name Arnold

David Kelly talks to Chris Hall from Locomotive Software

The Amstrad CPC464 is the first home computer Chris Hall has had a hand in designing

Amstrad began work on their machine almost two years ago Unfortunately by August last year it became apparent that there were difficulties with both original system software and the hardware

So Amstrad had a keyboard and a case together with a partly finished hardware design based around the 6502 processor And not much else

MEJ Electronics was brought in by Amstrad to sort out the hardware design They, in turn, got in touch with Chris Hall's software house Locomotive (both companies are composed of former Data Recall employees) and both decided to start again from scratch

The original design was ditched entirely and a new one was created based around the Z80 processor This was code named Arnold and became the Amstrad CPC64

The Z80 suited Amstrad because it gave the machine the possibility of running business software using the CP/M disc system And it helped Locomotive, which already had experience of the Z80 chip

Locomotive is a new company set up to develop system software "We don't do applications or games and we are very interested in speed — our Basic is fast!

"We literally first heard of the Arnold last August and the three of us — Richard Clayton Bruce Godden and myself — had a hectic few months " Locomotive actually started writing in September last year and had to work blind for six weeks

Locomotive and MEJ worked closely on the design "We had an idea of what price the machine was going to be sold for — which set the parameters for the hardware We couldn't knock out something 'noddy' On the other hand, we didn't have time to produce a QL from scratch

"Before we started we looked at the BBC machine because at that time we saw it as a market leader and we also had a look at the Commodore 64

"We already had our own Basic interpreter for a CP/M80/CP/M86 MSDOS system and the decision to use the Z80 in the Amstrad was driven by the fact that we couldn't possibly have written both the firmware and the Basic in three months

"There were a number of constraints which came from Amstrad's original thinking — the casing and keyboard and the inclusion of a cassette recorder and monitor That was all settled and had to be taken on.

"The monitor is a pixel VDU — the simplest sort When you do the sums you find the Amstrad has to be the way it is It is a straightforward 16K of memory for the display — two colours at 640 x 200, four colours at 320 x 200 or 16 colours at 160 x 200 You can 'suck' 16K from Ram just fast enough to refresh the screen

"The sound uses the GI chip — AY-3-8912 If you look at the number of sound chips there aren't very many and the GI has three channels

"A Centronics port seemed appropriate for a printer Having the built-in cassette player made life easier because its electronics are a bit special

"Add in a custom gate array and there you have the machine "

The main thrust behind the firmware was to make it as open as possible for other languages and software 'We tried to keep a firm distinction between the firmware and the Basic The Basic simply takes the commands keyed in packs them up and passes them to the firmware The HiSoft Pascal written for the machine, for example, has all the graphics and sound facilities that the Basic does '

Nearly all the features of the machine are implemented in the firmware and Basic "We wanted to avoid magic numbers in the Basic The Commodore machine has some very good hardware features but, without Simons Basic you have to spend your time 'poking' away with magic numbers Similarly, we knew we wanted to avoid confusing VDU19-type commands that the BBC suffers from

"The Arnold is intended to be as easy to program as possible After all, even an experienced programmer faced with a series of *Pokes* to various machine code addresses written some time ago may have trouble working out what is going on "

The firmware is written as a series of sub-routines There are no variable interfaces — no system variables to *Poke* around with Everything is written to use routines For example, the *Sound* command in Basic picks up the key commands organises the parameters and picks up the machine-code command *Sound Cue* in the firmware All of the machine code sub-routines in the firmware are documented Amsoft — Amstrad's computer division — will be publishing in full the firmware documentation

'Anybody writing software for the Amstrad should never need to go near the hardware The only possible point would be if you want particularly fast and flashy screen routines In this case we decided that it wasn't appropriate to provide generalised routines "

Software houses writing for the machine have been asked by Amsoft to write using the firmware provided rather than reinventing the wheel



One interesting feature of the CPC464 is its use of 'windows "We wanted the machine to have separate text and graphics windows " The way it works is to define an area of the screen as say, a graphics window and then anything plotted outside the area of the window is 'clipped' and not displayed

"We thought that one text window was a bit mean so we have got eight The text windows are tied up with the eight text streams Each stream has its own window its own cursor and its own *Pen* and *Paper* commands "You select a stream which you can then write to — and it will then plonk it out in that stream "

Another feature of the machine is its real-time controls At a machine code level the firmware incorporates a number of hardware interupts which, linked to an internal timer, can be used to trigger a sub-routine Frame fly-backs from the screen can also be used to 'kick' a routine

At the level of Basic two commands are provided *After (After n Gosub)* which jumps to the subroutine after *n* where *n* is a time in 1/50sec, and *Every (Every n Gosub)* which jumps to the subroutine every *n* — and gives a periodic effect.

Similar mechanisms are also provided for the sound commands Sound management is all done from the interrupt path so, unlike the Dragon the processor can carry on processing when a sound is being generated

With something around 12 weeks to complete the software on the Amstrad the Locomotive team had to work flat out The majority of the Basic was already written but it was rearranged and some new features were added The firmware was written piecemeal in modules Each of the five modules (1 sound, 3 screen 1 keyboard) were fully tested before going on to the next "We wrote them in a sensible order so that if the fundamental routines took longer to write than we expected then at least we had written them by the time we had to deliver the software to Amstrad!

"We handed over our finished software 14 weeks ago and the machines at the launch had finished Roms in them


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A secure future

***Gary Thorogood** tests his skill and judgement with a selection of games for the Vic20.*

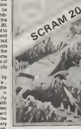
With the name of Commodore 64 on everyone's lips (or so it seems), Vic 20 owners may be excused for thinking that they are in the possession of a quaint and ancient relic the sole function of which is to act as a glorified calculator or as a medium for playing the most primitive of arcade-style games. This is not, of course, the case and there appear to be plenty of software houses up and down the country willing to prove that a limited memory counts for less than the unlimited imagination of a talented programmer.

Space Escort by Romik Software is a case in point, using the machine's resources to the full. Your task is to accompany 26 space liners to the newly conquered planet of Sistona. You are given nine fighters to repel the four waves of attack that you will encounter on your mission. Along the journey you will be met by a whole host of weird and wonderful opponents — Space Flies, Xethus Spirals and Giga Kamikazi to name but three. If you are skilful enough to destroy your adversaries, you land safely on the planet and then return to escort the remaining 25 liners. *Space Escort* is a fast moving, action-packed game with bright and colourful graphics, loud and vibrant music and enough happening on the screen to keep you fully occupied. The game has some interesting control devices allowing you to pause the action at any time should you need to catch your breath and to continue a new game where the previous one left off.

Scram 20 by Artic Computing Ltd is another game calling for all your reserves of manual dexterity. You must manoeuvre a spaceship through various hazards in order to destroy the enemy base. Points are amassed for eliminating the numerous obstacles and your fuel supply must be constantly replenished by means of bombing fuel dumps that are scattered along the trail. There are five sections to *Scram 20*, each providing a new and deadlier threat to your survival. The earlier bombs and U F O s may be formidable opponents but your nerve will really be tested by the Zoids and Superzoids lying in wait as you near the base. It is an exciting and demanding game and with five controls to operate, the use of a joystick is virtually essential.

Space Snake by Commodore, although set in the distant heavens is more technically down-to-earth. With the use of only two keys (up and down) you must guide the snake or its very rough approximation between deadly satellite mines and into a number of tunnels containing randomly placed eggs that have to be eaten. As you progress the game becomes faster the cosmos more littered with mines and the tunnels more winding and treacherous. *Space Snake* is an enjoyable game, mixing a couple of old ideas into a new formula but after a while the game can become rather repetitive.

What *Space Snake* lacks and what *Bengo* by Mr. Micro has in its favour, is a great deal of humour and a way of bringing something fresh to what are, after all, variations on two or three basic formulae. In this game you must move Bengo the Eskimo among the dastardly Snow Yeti who are purported to be half blind and half-witted. They are not as docile as they sound however — they can smell a good Eskimo lunch and will chase you in between blocks of ice in order to satisfy their hunger. Your only means of defence is to hurl the blocks across the icy plains and hope to kill the Yeti in the process. It is an enjoyable game and with nine levels of play and a diminishing time factor it calls for quick reflexes and a steady hand. The graphics are colourful (the action is set against the background of the Northern Light) and the intricately detailed

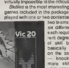


characters are three dimensional. You can play around in the frozen wastes until your heart (or the Yeti's stomach) is content whilst whistling away to the accompanying tune of *Hot Butter*. One point, this excellently packaged cassette can only be played with a joystick.

All the games we've looked at so far have been designed for the unexpanded Vic but if you do have an expansion unit there are programs on the market which cater for a larger memory and which, on the whole, are more ambitious in design and sophisticated in execution.

A good example is *Teddy* by Audiogenic which will need an 8K expansion at least. You are a bear living in the heavily vegetated woods supplementing your diet (and gaming points) by eating the occasional picnic basket or the pieces of fruit that are dotted about the forest. The tranquility of this Arcadian setting is disturbed by groups of lake snakes hissing venomously as they meander through the trees on your trail. Your only hope is to bite their tails which will kill them. However, if you miss and bite the creature in the middle it will merely sub-

divide, thereby doubling the threat The characters are well defined, at each level the snakes become more menacing as they squirm along to the nicely ironic tune of *The Teddy Bear s Picnic*, while the bear looks the epitome of cuddliness and vulnerability The emphasis is on humour and I think that you ll find *Teddy* an amusing game to play There is even a Hall Of Fame capability so that you can record the bravest teddy bears in your family



Unexpanded Vic 20, by joystick only.

A Mr. Micro Vic 20 Game

Patience by Commodore requires 3 8 or 16K expansion and is based on the popular parlour game The object is to place the four suites of cards in ascending order on their respective packs by means of carefully worked out moves The screen is set out in exactly the same way as the real thing and you have at your disposal all the controls necessary for dealing moving and placing the cards *Patience* requires a great deal of thought and planning and can be very rewarding should you succeed in getting all the cards out in the correct order (no two games are alike as the pack is reshuffled after each one)

It is obviously a program for the less adventurous games player but will, I think, involve all the family

Commodore Super Games Pack 2 also requires expansion and consists of two cassettes featuring four programs The first of the four *Blokit* is based on the principle of noughts and crosses where you have to arrange five rectangular blocks in a row in either a horizontal, vertical or diagonal direction The computer will try to stop you doing so by placing its own blocks in your path and attempting to build a row of its own *Blokit* is a slow game but one that requires strategic thought

Cannonade is a game for two players in which you have to destroy the opponent s cannon by firing shells through a hole in the dividing wall The angle and sped of the shot are pre-determined by the figures you enter into the computer before the game begins *Cannonade* is in effect a variant of *Battleships* and is one of the slowest and most uneventful games I ve yet played Should you have the willpower to continue and actually hit your opponent then a new game begins with the hole and the cannons resituated

In *Road Rally* you must drive your car (or to be precise a string of diamond shapes) along a road, negotiating treacherous bends whilst avoiding the sides of the road The longer you survive, the greater the points awarded You can choose the width of the road you require ranging from the virtually impossible to the ridiculously easy

Skittles is the most interesting of the four games included in the package It may be played with one or two contestants or even two teams There are six different formats, each requiring a different degree and type of skill but all are basically variations on the same theme — knocking down more skittles than your opponent *Skittles* probably has a higher boredom threshold than the other three games but after a few attempts the experienced games player will be looking for something a bit more mentally and physically taxing All the programs in the pack are variations on familiar patterns while the graphics are pedestrian and lifeless They demonstrate little of the imagination shown by many of the independant software manufacturers

Countdown by Paramount (requiring 8 or 16K expansion) is a good example of this The plot is so convoluted that space does not permit me to go into any great detail other than to say that your task is to defuse a time bomb and thereby avert a national disaster Within a very limited time scale you must escape from a house, make your way through the jungle and then ease along a sewer in order to reach your objective All manner of obstacles must be overcome including killer security devices man-eating plants and poisonous tendrils Along the way you must pick up pieces of gold and purloin four keys so that the bomb can be safely deactivated There are three levels of skill based on varying time limits and three screens, all very colourful and intricately detailed *Countdown* will test your resources of skill and ingenuity to the full and like all the best games, will both infuriate and thrill you

All in all, this collection of puzzles and games is proof enough that the output of software for the Vic 20 whether expanded or unexpanded, has far from diminished in either quantity or quality There is enough intelligence wit and originality amongst today s programmers to convince me that the future remains secure Thanks for the memory 64 but I ll stick to the Vic

Supplier	Game	Price	Value
Romik Software 272 Argyll Avenue Slough Berks	*Space Escort*	£5.99	8
Artic Computing Main Street Brandesburton Driffield YO25 8SL	*Scram 20*	£5 95	7½
Commodore Business Machines 675 Ajax Avenue Slough Trading Estate Slough Berks	*Spacesnake*	£4 99	8
Mr Micro PO Box 24 Swinton Manchester M27 3AI	*Bengo*	£6 90	8
Audiogenic Ltd 39 Sutton Industrial Park London Road Reading Berks	*Teddy*	£5 95	9
Commodore Business Machines	*Patience*	£4 99	8½
Commodore Business Machines	*Super Games Pack 2*	£11 99	4
Paramount Software 67 Bishopton Lane Stockton Cleveland	*Countdown*	£5 50	10


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This is the start of *PCW*'s Education Special a series which will run over the next few issues. We will be looking at a selection of educational software for various machines, giving some idea of the state of the market and the variety of material available.

The series begins with a set for very young children on the Spectrum, and a survey of some educational programs for Dragon 32

Buns and bagpipes

***Andy Pennell** looks at the Learning Box series from Arrow*

Learning Box is the title of a range of educational programs recently released for the 48K Spectrum from Arrow. There are eight packages in all, and divide into two distinct sections — four intended for children of three to six years, and four for older children up to the age of eight.

Each program is supplied in a large video-cassette box with colourful artwork, and look professional. Opening the boxes reveals several items — there is a Story Book, containing, among others, the tales of Hansel & Gretel and Red Riding Hood. There is also a Parents Guide, which explains all the connections required to the Spectrum, how to load the programs and their use. A very good idea is the inclusion of double-sided keyboard overlays, which simplify the cluttered Spectrum keyboard to a few distinct, coloured areas, so the child does not have to be at all keyboard literate. As well as all this there is the cassette itself containing on one side the program and on the other Toni Arthur reading the related story. Due to the packaging used, it can be very difficult indeed to remove the cassette from the plastic filler, and I expect most children and many adults could have problems removing it. Each program consists of several exercises, in gradual order of difficulty which can be done at any speed. They are designed to be used initially by both parent and child, but after a short while the child should be able to do each exercise unaided.

All the programs are written in machine-code, and practically fill the Spectrum memory. They all use lots of colour and sound to keep the children entertained. The graphics in all the programs are all excellent and very large. The graphics that Five Ways (the authors) have put into their programs makes many Spectrum games programs look positively crude, with well drawn colourful shapes. Another nice feature is that when alphanumerics are required instead of using the Spectrum's character set they have designed their own, which are most at least twice the size of the standard characters, and very nicely formed with true descenders.

Having dealt with their common features I shall discuss each package in turn, in approximate order of difficulty. *Five Little Ducks* is sub-titled *I Can Count*, and introduces the concepts of sorting matching and counting objects. It does this by using the ducks of the title together with some very good quack sound effects and neat graphics to produce ten gradual exercises that should end with the child being able to recognise and understand numbers up to five. The best scene is where various numbers of ducks, wings flapping, fly over a lake before diving in. Even Ultimate would probably be impressed by it!

The follow-on is *Nine Currant Buns* which deals with simple sums. This was my favourite, mainly because of the cutest addition sign I have ever seen — if you think that sounds strange I shall explain. When an addition is shown on the screen in large digits below it are the appropriate quantity of objects and the '+' sign changes into a delightful little man and puts the two piles of objects together. The reaction from all both young and old who have seen it is the same — "Aaaaah"

The third in the lower age-group section is *Red Riding Hood* which teaches the child to recognise letters and words, preparing him/her for reading. It does this by encouraging the child to match combinations of colours, pictures and words using characters and objects from the story. In fact, this is really two programs in one, as the parent can switch between *Red Riding Hood* and *Goldilocks*, giving two different vocabularies and sets of pictures. The different games of Snap within the program cleverly adjust their speed to suit the players, so that the attention of the child is maintained whatever their ability. Along similar lines and following on comes *Goldilocks* which extends the exercises so that the child becomes more familiar with groups of words, then sentences. It uses similar methods to *Red Riding Hood*, and like it has two complete sets of words and pictures. There was one aspect of *Goldilocks* that I thought was not done well enough. A sentence with one or two nouns replaced with pictures appears on the screen, and the child has to choose which of three words that Goldilocks points to is suitable. When a child makes a correct choice, the picture disappears, and I would like to have seen it remain, along with the word. It's only a minor gripe really as the rest of the program is just as good as the others.

Scene from Red Riding Hood

The first of those for older children up to the age of eight is *Mr Mac's Day* which helps teach the child the time. It does this using a character called Mr Mac, a train driver, who also seems to be a very natty little dancer in his spare time. The exercises take the child through Mr Mac's busy day, with continual reference to a large, on screen clock, which can be adjusted in five minute intervals. To begin with, there is a stunning animation sequence which starts with Mr Mac climbing out of bed, follows him to work, and then to his Scottish dancing session in the evening. This must be the first and only time a Spectrum has been used to make bagpipe sounds! The graphics in this section just have to be seen to be believed, as they really are cartoon quality. As well as some clever, but fun to do exercises on the normal 12-hour clock there is one on the Digital Clock, a sign of the times, and another on the 24-hour system. *Mr Mac's Day* is another excellent piece of software from Five Ways. Unfortunately the next package *The Magic Shop* was not as impressive. It is intended to teach the child about money and the use of the different denominations of coins, but I feel that it does not come up to the very high standard of the others in the series. It is very up to date though, including the 20p and £1 coins, while omitting the ½p but I found it rather difficult to use as it didn't seem to put the right sort of information on the screen, particularly the coins the child chooses. This is a shame, as the ideas used, which are based on buying weird objects to make spells, are very good, but the presentation lets it down.

Luckily the next package, *The Enormous Turnip* quickly redeemed Five Ways' reputation with its exercises to improve spelling skills, and the formation of words from sounds. It effectively uses the characters and events from the story, along with the



Hansel and Gretel

statutory brilliant graphics to do this in a very neat way. The final package under scrutiny is *Hansel and Gretel* which teaches some of the more complex letter combinations while increasing the child's vocabulary. It contains some quite frightening graphics, particularly of the Terrible Tree, and more clever animation. Particularly good is the sequence when Gretel pushes the Witch into the oven, rescuing her brother. The final exercise is a Hangman variant, which I found rather difficult at times! If you complete the word in time, you are rescued by your father and "There's no place like Home" is played, but if you fail the tree gets you, and it sounds as if something pretty horrible happens, but you are thankfully spared the graphics.

In conclusion, the programs in the Learning Box series (with the possible exception of *Magic Shop*) are all excellent, and should entertain most children while educating them very effectively. Those teachers who scoff at the Spectrum in primary schools should see these programs — they would probably sell their Beebs to buy a few Spectrums if they did. The only possible area of improvement would be for a Speech option, using perhaps the popular Currah unit, but they still offer a lot of fun and teaching for the reasonable price of £9.95 per package.

Supplier	Program	Age	Price
Arrow	*Five Little Ducks*	3-6	£9.95
17-21 Conway Street	*Nine Currant Buns*	3-6	£9.95
London	*Red Riding Hood*	3-6	£9.95
W1P 6JD	*Goldilocks*	3-6	£9.95
	Mr Mac's Day	up to 8	£9.95
	The Magic Shop	up to 8	£9.95
	The Enormous Turnip	up to 8	£9.95
	Hansel and Gretel	up to 8	£9.95

A higher plane

Keith and Steven Brain *survey a range of programs for Dragon 32*

As the Dragon has never really featured in the 'school micros' fight it is perhaps surprising that the range of 'educational' software for it continues to increase. On the other hand perhaps this is a reflection of the sad fact that it is no good giving every school a micro (of any make) if you don't also give money for software, and that most commercial educational software seems to be bought by 'concerned' parents rather than educational establishments!

Programs concerned with numeracy are common and in this selection we have looked at a number of offerings which are pitched at various age ranges. It is probably fair to say that the difficulties of producing good programs for the very young are minor compared to using the full potential of computer assisted learning for the older child, and that this tends to be reflected in both the number and quality of the material available for the more mature mind. Whilst simple games and pretty colours and sound may impress the average 4-5 year old they do not have the same impact on more cynical 11-16 year olds who are blasé about getting their names onto the high-score table of this month's favourite arcade game.

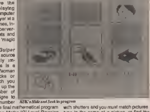
Ampalsoft's two-cassette *Maths Level One* goes a little further in exploring number relations and gives you a choice of two levels of difficulty. Scores are kept and you can change the sequence of exercises, and number of tries per exercise — although perhaps this is beyond the capabilities of the 4-6 year old, and since the instructions are in small print on a separate card it presupposes that the users can read. One to four children can play at the same time so it can be a group activity, but although there were some nice ideas our overall impression was that it was rather slow and it would probably need the constant attention of an adult. *Maths Level Two* is a similar two-cassette set from Ampalsoft which moves to a higher plane and includes 19 tests covering addition, subtraction, charts, tens and units, multiplication etc at various difficulty levels, but which is not very awe-inspiring.

Number Puzzler was written for Dragon Data by Applied Systems Knowledge of whom we have already formed a high opinion for some of their other educational programs. We were not disappointed as the program used large upper and lower case, hi-res graphics and sound, very effectively. You have the choice of playing against the computer or another player in a number of games, including a number version of noughts and crosses and 'magic squares'.

Number Gulper from the same source was similarly impressive. This is a version of *Pacman* using joysticks or keys in which you have to 'gulp' up the required number of the correct signs to produce the number displayed. The final mathematical program considered was *Maths 'O' Level Revision Part One* from Ampalsoft which gives comprehensive coverage of the typical school syllabus with problems included. The answers to these problems can be displayed and, if necessary, a more detailed explanation can be called for. It seemed quite useful and it makes a change from doing your set homework, but woe betide you if you do this instead!

The other major basic skill which must be learnt is the ability to deal with letters and words.

Words, Words, Words from Applied Systems Knowledge is versatile and interesting as it offers a series of scenarios such as 'the city', 'the street' and 'the house' from which objects to spell are displayed, and the various sections are well linked together. Another winner from ASK. *Hide and Seek* (ASK again!) consists of two different programs on opposite sides of the cassette which are aimed at helping memory development and early reading. Pictures are displayed and then covered up with shutters and you must match pictures, type in the name of a picture, or find the missing picture. This is certainly one of the best educational programs we've seen.



ASK's *Hide and Seek* in progress

continued on page 23

Education special

Once the fundamental basics of numbers and letters have been mastered more philosophically demanding areas can be considered Dragon Data's *Circus Adventure* is designed for children of primary school age and is billed as 'a beginner's adventure game' It seems that you can only go up or down (north or south) or left or right (east or west) alternately so that you cannot backtrack so progress is rather haphazard, but you are rewarded by pictures (low res) and music It is not exactly mind-blowing (and it would perhaps have Tony Bridge in fits of hysterics) but we suppose that everyone has to start somewhere *School Maze* is a similar program in which you must move around the school looking for a missing computer tape The least said about this particular tape the better — if we lost it we wouldn't bother to go looking!

Salamander's *Turtle Graphics* promises to be 'a method of drawing pictures with your computer which is both fun and educational, yet simple enough to be enjoyed by the young or inexperienced computer user and the enthusiast alike' It consists of a tape and a 28 page manual which includes details on how to transfer the program to disc You can produce pictures by controlling a 'turtle' which moves around the screen according to the traditional 'left', 'right' 'forward' etc commands Unfortunately although the pictures are produced on the hi-res screen, the commands are entered on the normal low-res text screen (command screen), so you cannot see what you are doing! This is totally unnecessary as hi-res text screen driver routines are now common and it rather spoils the attraction of the package

Editing of command lines is good and pictures can be scaled, and coloured A useful 'library' function is provided which can store up to 30 words which define particular movement patterns which can be saved and used in commands An option is included which allows you to also simultaneously plot your masterpiece on to one of the variously named four-colour plotters (MCP-40 etc), but regrettably there is no routine to dump the finished product onto a standard graphics printer This appeared at first sight to be an interesting offering which allows you to explore shape relationships, but we can't help wondering how long the interest would last for the 'not-so-young and inexperienced

Computer manuals are infamous for their general inadequacy inaccuracy or even (dare we say it) incompetence, so it is not perhaps surprising that someone has tried to remedy the situation by producing *Basic Tutorials* which the new user can use to learn new skills and test their own progress Ampalsoft offer both Beginners and Advanced level packages each containing two cassettes The former starts from absolute basics with "What is a computer?" and continues with "What is Basic", variables assignment statements, arithmetic operations simple input and output *Print @*, *Goto*, conditional statements and loops A tutorial section is followed and then you are advised to follow a practical session before continuing The practical work sets you problems, and you can also look at the 'solution', but it seems a pity that they do not use the computer to check your answers or run demonstrations of the programs The influence of the 'O' Level Computer Studies course is apparent — but in real life do people always use *End?* The Advanced package covers sound and graphics, subroutines user functions, arrays and data string manipulation etc

Inevitably such programs are on transient value as once you have mastered them you no longer have any need for them (unless, of course you can persuade one of your friends) When deciding whether you should buy such programs you should perhaps balance the value of your time, and your other commitments, against the time it takes to unravel the manual

Since we live in a real world where the cost of the product must depend upon its sales potential, it is probably inevitable that it is difficult for the quality of small-volume educational packages to stand comparison with games but certainly some of this selection were very impressive although others left a lot to be desired

Supplier	Program	Age	Price
Dragon Data	*Number Gulper*	4 11	£10.95
Kenfig Industrial Estate	*Words Words Words*	5-8	£10 95
Margam	*Hide and Seek*	4-11	£10 95
Port Talbot	*Number Puzzler*	4 11	£10 95
West Glamorgan	*Circus Adventure*	4 8	£7 95
SA13 2PE	*School Maze*	4-8	£7 95
Ampalsoft	*Maths O level*		
P O Box 19	*Revision Part One*	16+	£14 95
Knutsford	*Maths Level One*	4-6	£14 95
Cheshire	*Maths Level Two*	6-7	£14 95
	Basic Tutorial		
	Beginners Level	general	£14 95
	Advanced Level	general	£14 95
Salamander Software	*Turtle Graphics*	general	£9 95
17 Norfolk Road			
Brighton			
East Sussex			
BN1 3AA			

The point of the plot

***Mark Lawrence** presents a machine code plotter program*

This program is written in machine code and so has the advantage of being able to plot on the full 256 x 192 pixel screen as opposed to Basic where you can only plot on a 256 x 176 pixel screen Likewise all the commands available have this facility so it is, for example possible to copy the whole screen to the ZX pnnter

As well as commands for drawing and plotting, there are commands available for copying to the ZX pnnter filling in shapes saving a screen to tape loading a screen from tape changing every occurrence of a specified ink or paper colour to another, storing screens in memory, retrieving screens from memory, and swapping the screen with one stored in memory

The plotting point is moved around the screen with the keys 5 to 8 and the above commands are activated using the keys listed in the menu Incorporated within the program

To enter the program firtt type in the short Basic program and *Save "draw" Line 1* then verify it Now type in the has loader and run it. Enter *30000* as the start address as it is not possible to enter it to its correct address yet The short Basic program will handle this Now enter the code and *Save "draw code" Code 30000 1760* then verify it. Clear the machine by entering *Randomize USR 0* and load the program from the start If the code has been entered correctly a menu should be displayed Should you not obtain this display type in the check program and load the code to *30000* again Now check the code against the listing and poke any incorrect entries

When saving a screen to tape start the tape and then press s No message will be displayed as this would destroy the bottom line To fill a shape, position the cursor within the shape and then press the ! key The routine will ask you for the colour

The fill routine in this program is actually one previously published in *Popular Computing Weekly* but converted to work on the full 256 x 192 screen

```
_ gu Basic

> LIST
  10 CLEAR 23999:LOAD ""CODE 24000
  20 RANDOMIZE USR 24000

                DRAW CODE

5DC0  AF 0? BF 22 5B 62 21 54
5DC8  62 77 28 3C 77 CD 68 0D
5DD0  CD 28 5E CD 28 61 CD E0
5DD8  00 CD 7A 00 C [illegible] [illegible] 50 CD
5DE0  01 00 CD 0D 62 F [illegible] 10 CC
5DE8  20 01 FE 18 CC 65 60 F[illegible]
5DF0  00 28 04 CD 60 0D AF F[illegible]
5DF8  00 CC F3 5F FE 0F [illegible] 27
5E00  5F FE 20 CC 1F 5F F6 1F
5E08  CC FF 5E FE 1A C [illegible] 5 5E
5E10  FE 27 CC CD 5E FE 01 CC
5E18  5E 5E FE 18 CC 8E 5E F
5E20  11 CC 28 5E FE 28 20 AE
5E28  C9 3A 54 62 F5 CD CD 5E
5E30  CD 00 0D 21 2E 40 11 0F
5E38  03 0D 04 CD 2E 62 2E 60
5E40  11 13 03 06 59 CD 2E 62
5E48  21 00 40 [illegible] AE 63 06 DA
5E50  CD 2E 62 21 24 50 11 00
5E58  04 06 10 CD 2E 62 AF 7D
5E60  37 22 21 00 58 11 01 58
5E68  01 00 00 30 17 ED 00 01
5E70  A0 01 36 90 ED B0 01 40
5E78  00 36 38 ED B0 01 C0 00
5E80  36 07 ED 00 CD 0D 62 F1
5E88  32 54 62 C3 03 5E 21 FD
5E90  61 22 0D 5E CD 5E 5E 21
5E98  C4 61 22 0D 5E C9 CD 93
5EA0  61 21 E0 50 11 FA 02 06
5EA8  19 CD 2E 62 CD E3 61 F[illegible]
5EB0  05 30 F8 CD C1 5E E0 E5
5EB8  CD AC 61 E1 CD C4 61 AF
5EC0  C9 07 5F 16 00 21 53 62
5EC8  19 5E 23 56 C9 CD 70 60
5ED0  21 54 62 7E 5F 3C FE 05
5ED8  20 01 AF 77 78 CD C1 5E
5EE0  CD 0F 01 AF C9 11 11 00
5EE8  D5 DD E1 AF 37 CD 56 05
5EF0  DD 2 00 40 11 00 10 5E
5EF8  [illegible] [illegible] CD 5B [illegible] [illegible] [illegible] [illegible]
5F00  [illegible] [illegible] [illegible] 11 [illegible] [illegible] [illegible] [illegible]
5F08  [illegible] [illegible] [illegible] DB [illegible] [illegible] [illegible] [illegible]
5F10  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
5F18  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
5F20  [illegible] [illegible] [illegible] AF [illegible] [illegible] [illegible] [illegible]
5F28  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
5F30  [illegible] [illegible] CD [illegible] [illegible] [illegible] [illegible] [illegible]
5F38  CD [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
5F40  30 [illegible] 5C [illegible] [illegible] [illegible] 32 0F
5F48  5C [illegible] 42 42 [illegible] [illegible] 5F 48
5F50  04 [illegible] FE AE [illegible] [illegible] 5F C5
5F58  D5 CD [illegible] 01 [illegible] D1 22 D1
5F60  C1 C5 D5 CD [illegible] 3D D1 C1
5F68  3C 30 FE 01 C2 4C 5F 42
5F70  48 E0 55 5F [illegible] 05 78 FE
5F78  01 DA 05 5F C5 D5 CD 18
5F80  61 CC D1 22 D1 C1 C5 D5
5F88  CD D5 2D 01 C1 3C 30 FE
5F90  01 C2 78 5F AF C5 48 C5
5F98  D5 ED 43 7D 5C CD 18 01
5FA0  CD EC 22 D1 C1 0C 79 FE
5FA8  FF D2 C4 5F C5 D5 CD 18
5FB0  01 CD D1 22 D1 C1 C5 D5
5FB8  CD D5 20 D1 C1 3C 3D FE
5FC0  01 C2 97 5F 48 C5 D5 ED
5FC8  43 7D 5C CD 18 01 CD EC
5FD0  22 D1 C1 0D 79 FE 01 DA
5FD8  F2 5F C5 D5 CD 18 01 CD
5FE0  D1 22 D1 C1 C5 D5 CD D5
5FE8  20 D1 C1 3C 3D FE 01 C2
5FF0  C5 5F C9 CD 93 01 21 E0
5FF8  50 11 00 02 00 14 CD 2E
6000  62 CD 0D 02 FE 23 28 04
6008  FE 13 20 F5 DD 21 5F 62
6010  DD 7 00 11 D0 62 CD 2E
6018  62 08 14 CD 2E 62 CD E3
6020  01 DD 77 01 7E E7 06 07
6028  11 E4 62 CD 2E 62 CD E3
6030  61 DD 77 02 DD 7E 00 FE
6038  23 20 17 DD 7E 01 17 17
6040  17 DD 77 01 DD 7E 02 17
6048  7 1 DD 77 02 3E 30 32
6050  F 6 DD 5B 01 DD 5E 02
6058  CD F4 61 3E 07 32 FD 61
6060  CD AC 61 AF C9 21 53 62
6068  7E EE 01 77 CD 70 00 C9
```

```
60C0  02  FE  08
60C8  AF  C8  53
60D0  E1  77  0E
60D8  EE  1C  80
60D8  C8  07  30
60E0  F5  ED  40
60E8  47  84
60F0      00
60F8  DD  21
6100  80
6108  7C  D6  40
6110  2F  C6  5F  07
6118  7   F1  C5  3E
6120  21  E8  3A          E1
6128  80  38  47          80
6130  21  E0  98  1   73  8Z
6138  D   2E  07  CD  E3  0A
6140  22  11  97  62  00  0   C0
6148  62  CD  E3  01  4F  11  A7  62
6150  06  14  CD  2E  62  CD  53  01
6158  C8  07  0   07  C0  07  01  32
6160  52  02  11  03  62  CD  2E  02
6168  CD  E3  01  21  80  60  C8  07
6170  C8  07  C0  07  4F  3A  50  62
6178  6   0   01  32  0D  5E  70  01
6180  00  03  5F  E   E0  07  03  77
6188  3   88  78  01  30  F5  CD  AC
6190  01  AF  C9  F5  21  E0  30  11
6198  30  58  00  00  C5  50  28  7E
61A0  12  13  23  10  FA  2E  E0  C1
61A8  10  F2  1   C9  21  5F  01  3C
61B0  1A  3   36  7   5   CD  53  01
61B8  E1  36  1   28  50  7E  C9  21
61C0  00  40  0   03  11  00  40  01
61C8  00  10  D   00  C9  F5  11  00
61D0  4E  01  00  10  1A  F5  7E  12
61D8  1   7   1   5   08  78  01  20
61E0  F3  F1  0   E5  2   40  5C  20
61E8  00  7   D6  30  30  F8  FE  08
61F0  30      E1  C5  5   21  80  58
61F8  01  00  0   7E  0   07  8A  20
6200  84  7E  92  83  77  23  00  20
6208  01  20  F0  F1  C9  C   D5  E5
6210  D   0E  02  78  FE  FF  28  F0
6218  3C  E   D1  1   C9  5   C5  D5
6220  E5  06  00  1A  77  13  24  10
6228  FA  E1  D   C1  F1  C5  F5  C5
6230  D   F5  D6  E   3A  0   20  25
6238  00  5F  29  29  29  11  00  3D
6240  19  E0  E1  C   10  02  D1  13
6248  23  0   E   E1  D1  1   F1  C9
6250  33  78  16  00  04  FA  64  FA
6258  7   FA  9A  A   05  FA  D0  13
6260  07  84  83  73  03  72  65  85
6268  6E  20  20  0   20  80  18  80
6270  40  70  80  42  6F  72  64  85
6278  72  22  63  0F  6C  6F  75  72
[illegible]  20  F  [illegible]
```

```
[illegible]                      6F  75  [illegible]  [illegible]
[illegible]                  20  20  20  20  19
[illegible]                  43  6F  6C  6F  [illegible]
[illegible]                  20  20  20  20  [illegible]
[illegible]                  07  72  6F  [illegible]  [illegible]
[illegible]                  0F  6   6   [illegible]  [illegible]
[illegible]                  49  6E  66  [illegible]  [illegible]
[illegible]              30  61  70  65  [illegible]  0
[illegible]          20  20  49  2F  50  [illegible]  20
[illegible]  [illegible]  60  61  0E  67  65  20  66
[illegible]  [illegible]  6F  6D  20  3F  20  20  20
[illegible]  20  20  20  20  74  6F  20  3F
[illegible]  20  20  20  57  60  69  63  60
[illegible]  30  03  6F  6C  0F  75  72  20
[illegible]  3F  20  57  60  09  63  68  20
[illegible]  73  63  72  65  65  6E  20  3F
[illegible]  20  20  30  2D  34  29  20  40
[illegible]  65  6E  75  41  20  20  3   24
[illegible]  5F  72  65  20  73  63  72  65
[illegible]  65  6E  20  69  6E  20  6D  65
[illegible]  6D  6F  72  79  2E  20  20  20
[illegible]  20  20  20  42  20  20  52  65
[illegible]  74  72  69  65  76  65  20  73
[illegible]  63  72  65  65  65  6E  20  66
[illegible]  72  6F  6D  20  6   65  6D  6F
[illegible]  72  79  2E  43  20  20  43  68
[illegible]  61  6E  67  65  20  61  74  74
[illegible]  72  69  62  75  74  65  73  2E
[illegible]  20  20  20  20  20  20  20  20
6370  20  20  20  46  20  20  46  69
6378  6C  6C  20  61  20  73  68  61
6380  70  65  2E  20  20  20  20  20
6388  20  20  20  20  20  20  20  20
6390  20  20  20  4   20  20  4C  6F
6398  61  64  70  61  20  73  63  2
63A0  65  65  6E  20  66  72  6F  6D
63A8  20  4   61  70  65  2E  4D  20
63B0  20  44  69  73  70  6C  61  79
63B8  73  20  74  69  69  73  20  6D
63C0  65  6E  75  2E  20  20  20  20
63C8  20  20  20  20  20  20  4E  20
63D0  20  43  68  61  6E  67  65  20
63D8  65  76  65  7.  79  20  6F  63
63E0  63  75  2   65  6E  63  65  2E
63E8  30  20  20  20  20  20  4F  20
63F0  30  43  60  61  6E  67  [illegible]  20
63F8  70  6C  6F  74  74  69  6E  67
6400  20  6D  6F  64  65  2E  20  20
6408  20  20  20  20  20  20  [illegible]  20
6410  20  53  61  76  65  20  61  20
6418  73  [illegible]  72  65  65  6E  20  74
6420  6F  20  74  61  70  65  2E  20
6428  2   20  20  20  20  20  5E  20
6430  20  4   6   65  61  72  20  73
6438  63  72  65  65  6E  2E  20  20
6440  20  20  20  20  20  20  20  20
6448  20  20  20  20  20  20  58  20
6450  20  53  77  61  70  20  73  63
6458  72  65  65  6E  2F  20  20  20
6460  20  20  20  20  20  20  20  20
6468  20  20  20  20  20  2E  5A  20
6470  20  43  6F  70  79  20  3   63
6478  72  65  65  6E  20  74  6F  20
6480  20  72  69  6E  74  65  72  2E
6490  50  2   65  73  73  20  61  6E
6498  79  20  6B  65  79  20  74  6F
6498  20  7   [illegible]  70  6   72  6E  2E
```

Programming

Negative thoughts

Jim Hind presents a simulation of the Geiger-Marsden experiment for the Spectrum

About the turn of the century, it was known that atoms contained electrons, but that was about all. No further details of the internal structure of an atom were yet understood.

Since an atom is electrically neutral, but an electron carries a negative charge, obviously an atom must contain a positive charge also. The favoured model was the "plum pudding" in which a uniform sphere of positive charge had tiny electrons dotted about within it. To examine the structure of the pudding in more detail, the atoms would be bombarded with either electrons or alpha particles (helium nuclei) arising from the radioactive decay of heavy elements. The classic experiment was carried out in Manchester by Geiger and Marsden, and their results are simulated by this program.

At the bottom of the screen, a radioactive source fires alpha particles at a thin gold foil in the centre. Many pass straight through without hitting anything; the program ignores these. Occasionally an alpha particle will collide with an atom of gold in the foil and be scattered. A zinc sulphide screen detects the scattered alpha particle. The program repeats until 1000 alpha particles have been scattered, displaying a count of those particles which hit the ZnS screen at the angle chosen. You are then given the option of placing the screen again and repeating the experiment.

The plum pudding model would suggest that the heavy alpha particles should be scattered by 10 or 20 degrees at most. Geiger and Marsden were baffled to find that an occasional particle would be deflected by anything up to a right angle. They reported this to Professor Ernest Rutherford, who promptly countered with a deliberately silly suggestion — why not see whether any particles were scattered by more than a right angle? Sure enough, alpha particles were bouncing back off the gold foil in all directions including almost directly backwards. Rutherford afterwards described this as being as incredible as firing the guns of a battleship at a piece of tissue paper and having the shells come back and hit you.

After you've run the program a few times you may get rather frustrated waiting for a large-angle scatter; they don't happen very often. To speed things up a bit, amend line 1320 to

```
1320 LET s(k)=s(k) + 1:PRINT AT k+1,27; s(k)
```

You can then increase the number of alpha particles by altering line 1205. Try

```
1205 FOR a = 1 TO 10000
```

Increasing the count past 65535 will not improve matters any further, though. After that you will be frustrated by the Spectrum's rather rudimentary *Rnd* function.

These changes bypass the graphics routines and simply count up the total number of alpha particles scattered into each 10° sector. Remember, you're not expecting *many* large angle events; the surprise is that any are happening at all.

The explanation of the experiment is due to Rutherford: for scattering to happen like this, the electric fields inside the atom must be enormously greater than the plumb pudding model would suggest. Geiger and Marsden have demonstrated the existence of the atomic nucleus. The "solar system" model of the atom, with a heavy (and extremely tiny) nucleus at the centre, with electrons orbiting round it, has been with us ever since.

Notes

The gold foil is printed with a Graphic G at line 1030. The various alphas are Graphic A s.

```
 0 REM [illegible] D J D Hind 1984
 10 FOR n=0 TO 7: READ a: POKE USR "G"+n,a: NEXT n
 20 DATA 0,0,0,0,0,0,0,255
 30 FOR n=0 TO 7: READ a: POKE USR "A"+n,a: NEXT n
 40 DATA 0,0,56,60,74,66,0,0
 50 DIM x(4): DIM y(4): DIM n(17): DIM c(17): DIM s(17)
 60 PAPER 0: INK 1: BORDER 0: CLS
 70 FOR i=2 TO 17: LET s(i)=0: NEXT i
 100 PRINT AT 0,3;"ALPHA-PARTICLE SCATTERING"
 110 PRINT "  This program simulates the scattering of α-particles by gold foil (Geiger & Marsden's experiment, Proc.Roy.Soc. LXXXII,p.495 (1909))"
 120 PRINT "  An α-particle source at the foot of the screen will fire α-particles at a gold foil in the centre. You may place a"
 130 PRINT "zinc sulphide screen to detect the scattered particles"
 140 PRINT "  Choose the angle at which you will place the detector - a multiple of 10 degrees, from 10 to 170."
 150 INPUT as: IF as<10 OR as>170 OR as/10<>INT (as/10) THEN GO TO 150
 160 LET phi=as*PI/180
 170 CLS : PRINT AT 10,11; FLASH 1;"SETTING UP"
 180 PRINT AT 11,11; FLASH 1;"EXPERIMENT"
 190 LET t=0
 200 FOR i=1 TO 17
 210 LET csc=1/SIN (i*PI/36): LET cs=csc*csc: LET cs=cs*cs
 220 LET n(i)=cs: LET t=t+n(i)
 230 NEXT i
 240 FOR i=1 TO 17: LET n(i)=n(i)/t: NEXT i
 250 LET c(1)=n(1)
 260 FOR i=2 TO 17
 270 LET c(i)=c(i-1)+n(i)
 280 NEXT i
 900 REM [illegible]
 1000 CLS : FOR n=0 TO 21
 1010 PRINT PAPER 0;
 1020 NEXT n
 1030 PRINT AT 10,16; PAPER 0; INK 6;
 1040 PRINT AT 21,16; PAPER 0; INK 6;
 1050 LET x(1)=84+84*SIN (phi-0.05): LET y(1)=88+84*COS (phi-0.05)
 1060 LET x(2)=84+88*SIN (phi-0.05): LET y(2)=88+88*COS (phi-0.05)
 1070 LET x(3)=84+88*SIN (phi+0.05): LET y(3)=88+88*COS (phi+0.05)
 1080 LET x(4)=84+84*SIN (phi+0.05): LET y(4)=88+84*COS (phi+0.05)
 1090 GO TO 1200
 1095 REM [illegible]
 1100 PAPER 0: INK 4
 1110 PLOT x(1),y(1)
 1120 FOR n=2 TO 4
 1130 DRAW BRIGHT 1,x(n)-x(n-1),y(n)-y(n-1)
 1135 NEXT n
 1140 DRAW x(1)-x(4),y(1)-y(4)
 1150 PAPER 0: INK 1
 1170 RETURN
 1195 REM [illegible]
 1200 GO SUB 1000: GO SUB 1100
 1205 FOR a=1 TO 1000
 1210 LET prob=RND
 1220 FOR i=1 TO 17
 1230 IF prob<c(i) THEN LET k=i: GO TO 1300
 1240 NEXT i
 1300 BEEP 0.0008,24
 1310 LET theta=k*PI/18
 1320 IF ABS (theta-phi)<0.0001 THEN GO TO 1400
 1330 NEXT a
 1340 GO TO 2000
 1390 REM [illegible]
 1400 FOR q=1 TO 2
 1405 PLOT OVER 1; INK 2;84,0
 1410 DRAW BRIGHT 1; OVER 1; INK 2;0,78
 1420 PLOT OVER 1; INK 2;84,87
 1430 DRAW OVER 1; INK 2; BRIGHT 1;84*SIN phi,84*COS phi
 1440 PAUSE 3
 1450 NEXT q
 1500 PRINT AT 10,10; PAPER 0; INK 0;
 1510 GO SUB 1000: LET s(k)=s(k)+1: PRINT AT k+1,27;s(k): GO TO 1330
 1600 REM [illegible]
 1605 PRINT AT 0,22;"ANG EVENTS"
 1610 FOR i=1 TO 17
 1620 PRINT AT i+1,22; FLASH (as=10*i);10*i
 1630 NEXT i
 1640 FOR i=1 TO 17
 1650 IF s(i)=0 THEN GO TO 1680
 1660 PRINT AT i+1,27;s(i)
 1680 NEXT i
 1690 RETURN
 2000 INPUT "Repeat in a different position? (Y/N)";r$
 2010 IF r$="n" OR r$="N" THEN GO TO 3000
 2020 IF r$="y" OR r$="Y" THEN CLS : GO TO 140
 2030 GO TO 2000
```

Handle with care

***Jason Orbaum and Geoffray Campbell** continue their series on Assembly language with a discussion of data handling commands*

We have already discussed a few of the assembler commands in previous parts, but there are a lot more where they came from The commands can be split into two admittedly very broad groups First there are those which perform arithmetic and logic functions and secondly there are those that perform data handling tasks Before we deal with these, it is necessary to have very clear visualisation of how the processor stores and handles numbers

As has been mentioned before numbers are stored in binary form There are two ways of storing numbers — unsigned or signed If a number is unsigned it can be between 0 and 255 If on the other hand it is signed, it can be between −128 and 127 The signed numbers are stored in two's complement form, which means that the left-most bit is treated as −128 instead of 128 as in an unsigned number Thus

```
01100010 = 98 but
11100010 = -30 (work it out!)
```

All the data handling commands can work on either memory or register numbers. The *LSL* and *LSR* command will shift the bit-pattern of a byte along by one, bringing a zero in on the end The mnemonics stand for logical shift left and logical shift right The effect of this is respectively to multiply and divide the number by two, but it will obviously give an integer answer

If we carry this operation out on the two example numbers above, we get

```
LSL 01100010 – 11000100
LSR 01100010 = 00110001
LSL 11100010 = 11000100
LSR 11100010 = 01110001
```

The *ASL* and *ASR* command will shift all the bits of the number along by one in a similar way to *ASR* and *ASL* but it leavse the sign bit (the left-most one) alone The mnemonics stand for Arithmetic Shift Left and Arithmetic Shift Right If these commands are carried out on the two example numbers above, we get

```
ASL 01100010 = 01000100
ASR 01100010 = 00110001
ASL 11100010 = 11000100
ASR 11100010 = 11110001
```

With all four of these commands, the state of any bit that is shifted out of the bit-pattern is preserved in the C-bit of the Condition Code

ROL and ROR

This operation is similar to the logical shifts, but the bit which comes on at the end is not a zero but the contents of the C-bit The state of the bit that is shifted out of the bit-pattern is preserved in the C-bit If we assume that the C-bit contains one initially for all of these operations, we now get these results

```
ROL 01100010 – 11000101 – C-bit contains zero
ROR 01100010 = 10110001 – C-bit contains zero.
ROL 11100010 = 11000101 – C-bit contains one
ROR 11100010 = 11110001 – C-bit contains zero
```

The format for these commands is

```
RORA
ROLB
ROL memory address
```

or any combination of register or memory and command

The *EXG* and *TFR* commands are used to EXchanGe or TransFeR the contents of any pair of registers (as long as they are the same size — it is impossible to exchange the contents of A with those of X)

The only difference between the two is that *EXG* preserves the contents of both registers, whilst TFR duplicates the contents of the first specified register

PSH and PUL

The workings of a stack were discussed in parts two and four, and these are the commands to use when accessing them *PSHS* will put the contents of the specified registers on to the stack.

If a program contains the commands

```
PSHS A,X,Y
PULS A,X Y
```

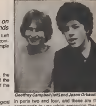
then the processor will put the contents of the A X and Y registers on the system stack, carry on with the program and then pull A, X, and Y in the opposite order to the order that they were pushed to avoid getting them swopped round The order that the registers are pushed onto the system stack is as follows

PC U Y X DP B A CC

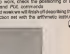
from left to right. The order for the user stack is the same, but, as it would be unwise to push the pointer for the stack in use, the S register is pushed instead of the U register

As has already been mentioned, the system stores the return addresses for subroutines on the stack, so if a program fails to work, check the positioning of all *PSH* and *PUL* commands

Next week we will finish off describing the instruction set with the arithmetic instructions



Geoffrey Campbell (left) and Jason Orbaum





Colour blind

***Jeff Tullin** presents a program that tests for colour blindness*

The program was written for the BBC computer and is primarily intended as a simple means for testing for colour blindness in a local infirmary. The idea was that it should be operable by "one finger" typists or mentally retarded people.

The program draws seven coloured blocks on the screen and plays a short piece of music. Following this a randomly coloured block appears underneath and moves in stages left to right. When the moving block is underneath the matching colour, the examinee is required to press the spacebar, which will elicit a musical response depending upon whether they are correct.

At the end of the round the score is displayed and pressing any key will re-run the program. As the volume, speed, and length of the test are very much a matter of individual preference, the escape key can be used to select a menu for altering these parameters *(Procalter)*.

The structure of the program lies between lines 70-580 and, I hope, is fairly clear. Lines 370-410 ensure that the spacebar is no longer depressed before moving on.

On a final note, the program can be used to test reaction time by selecting a short "speed of reaction" time. Due to the use of mode 7 graphics, the program will not run on the Electron as it stands, but the structure of the program would allow a fairly easy translation to another mode, by changing the print statements.

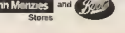
```
"COLOUR-MATCH by J.TULLIN
                1984
    1 *KEY10OLD MRUN M
   10 DATA2,7,12,17,22,27,32
   15 DATA32,129,157,32,32,32,130,157,
32,32,32,131,157,32,32,32,132,157,32,3
2,32,133,157,32,32,32,134,157,32,32,32
,135,157,32,32,32,157,156
   20 DATAA,3,F,3,M,3,D,3,M,3,F,3,C,3,
F,3,M,3,B,3,K,1 5,J,1 5,F,4
   30 DIMPOSITION(9)
   50 VOLUME -12:LIMIT=12:SPEED=70
   60 ONERRORIFERR=17PROCALTERELSEREPO
RT:END
   70 MODE7
   90 VDU23 1,32,0,0;0;
  110 PROCVARIABLES
  130 PROCINTRO
  150 PROCTUNE
  170 PROCKEYPRESSED(100)
  190 REPEAT
  210   PROCDRAWBLOCKS
  230   PROCCHOOSECOLOUR
  250   REPEAT
  270     PROCTESTBLOCK(COLOR)
  290     NO=value value=(value+1)MOD8
:IFvalue=0value=1
  310     UNTILKEYPRESSED
  330   PROCCHECK
  350   IFRIGHTTHENPROCHAPPYELSEPROCOOPS
  370   FORLOOP=1TO10
  390     IFINKEY$(20)<>  GOTO390
  410     NEXT
  430   IFRIGHTTHENSCORE=SCORE+1
  450   TRIES=TRIES+1
  470   UNTILTRIES=LIMIT
  490 PROCTUNE
  510 PROCSCORE
  530 PRINTTAB(4,18)CHR$(141) CHR$(134
) ANY KEY FOR ANOTHER ROUND
  540 PRINTTAB(4,19)CHR$(141) CHR$(130
)'ANY KEY FOR ANOTHER ROUND
  550 DUMMY=GET
  560 GOTO70
  570 CLS
  590 DEFPROCINTRO
  610 PRINTTAB(10,1)CHR$(141)CHR$(129)
'COLOUR MATCH
  630 PRINTTAB  8  )CHR$(141)CHR$(129)
 COLOUR MATCH'
  650 PROCKEYPRESSED 50)
  670 PRINTTAB(4 5)CHR$(141)CHR$(131)
PLEASE MATCH THE COLOURS
  690 PRINTTAB(4,6)CHR$(141)CHR$(131)"
PLEASE MATCH THE COLOURS"
   10 PRINTTAB(4,8)CHR$(141)CHR$(131)"
BY PRESSING THE';CHR$(133); SPACEBAR"
  730 PRINTTAB(4,9)CHR$(141)CHR$(131)"
BY PRESSING THE ,CHR$(134); SPACEBAR'
  750 ENDPROC
  770 DEFPROCKEYPRESSED(DURATION
  790 KEYPRESSED=INKEY(DURATION)+
  810 ENDPROC
  830 DEFPROCTUNE
  840 RESTORE20
  850 FORT NE-1TO13
  860   READnote$,len:note=(ASC(note$)
43)*4 len=len*4
  870   SOUND1,VOLUME, ote,len SOUND2,
VOLUME,note,len:NEXT
  890 FORTUNE=1 0600 NEXT
  890 ENDPROC
  910 DEFPROCDRAWBLOCKS
  930 PRINTTAB(0,12); FORROW=1TO5 PRIN
TBLOCK$:NEXT
 1010 ENDPROC
 1030 DEFPROCCHOOSECOLOUR
 1050 COLOR=RND(
 1070 ENDPROC
 1090 DEFPRO TESTBLOCK( OLOR)
 1110 PRINTTAB(POSITION(value ,10)CHR$
(144+COLOR) r0=
 1130 PROCKEYPRES ED S EED)
 1150 PRINTTAB(POSITION(value),10)

 1170 ENDPROC
 1190 DEFPROCCHE K
 1210 IFNO=COLOR RIGHT=TRUEELSERIGHT=FALSE
 1230 ENDPROC
 1250 DEFPROCHAPPY
 1270 SOUND1,VOLUME,148,2 SOUND1,VOLUM
E,152,2 SOUND1,VOLUME,100,3
 1290 ENDPROC
 1310 DEFPROCOOPS
 1330 SOUND1,VOLUME,16,5 SOUND1,VOLUME
,4,0
```

```
1350 ENDPROC
1370 DEFPROCSCORE
1390 CLS
1410 PRINTTAB(11,8)CHR$(141)CHR$(134)
'YOU SCORED '
1430 PRINTTAB(11,9)CHR$(141)CHR$(134)
YOU SCORED
1440 SPACE=11-IFLIMIT>9SPACE=10
1450 PRINTTAB(SPACE,12)CHR$(141)CHR$(
133);SCORE;  OUT OF  ;LIMIT
1470 PRINTTAB(SPACE,13)CHR$(141)CHR$(
133),SCORE,  OUT OF ';LIMIT
1490 ENDPROC
1510 DEFPROCVARIABLES
1530 RIGHT=0:TRIES=0
1550 value=1
1590 SCORE=0
1610 KEYPRESSED=FALSE
1630 RESTORE
1640 FORZ=1TO7:READPOSITION(Z):NEXT
1645 BLOCK$=
1650 REPEAT READCELL:BLOCK$=BLOCK$+CH
R$(CELL):UNTILCELL=156
1660 NO=1
1680 ENDPROC
1700 DEFPROCALTER
1710 CLS
1720 PRINTTAB(3,3)CHR$(129) TIME ALLO
WED FOR KEYPRESS= ;CHR$(130)SPEED
1730 PRINTTAB(3,5)CHR$(129) VOLUME OF
MUSICAL PIECES = ;CHR$(130),ABS(VOLUME)
1740 PRINTTAB(3,7)CHR$(129) NUMBER OF
GOES PER ROUND = ;CHR$(130),LIMIT
1750 PRINTTAB(3,10)CHR$(134)"WHAT WOU
LD YOU LIKE TO ALTER?'
1760 PRINTTAB(7,14)CHR$(130)'1) ;CHR$
(133); TIME ( 10-200 )
1770 PRINTTAB(7,15)CHR$(130)'2)',CHR$
(133),'VOLUME ( 0-15 )'
1780 PRINTTAB(7,16)CHR$(130) 3) ;CHR$
(133); GOES  ( 1-255 )
1790 PRINTTAB(7,17)CHR$(130) 4) ;CHR$
(133); NOTHING
1800 A=GET
1810 A=A-48:IFA<1ORA>4THENGOTO1800
1820 GOTO(1820+A*10)
1830 INPUTTAB(9,21)'TIME  ,SPEED:PRIN
TTAB(9,21)'                    :IFSPEED
<10SPEED=10:GOTO1710
1840 INPUTTAB(3,21) VOLUME  ,VOLUME:I
FVOLUME>15VOLUME=15:VOLUME=VOLUME*TRUE
 GOTO1710 ELSEIFVOLUME<0VOLUME=0 GOTO1
710 ELSEVOLUME=VOLUME*TRUE GOTO1710
1850 INPUTTAB(9,21) GOES  ,LIMIT:PRIN
TTAB(9,21)"                       IFLIMIT
<1LIMIT=1:GOTO1710
1860 ENDPROC
>
```


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In the moog for music

Paul Irvine presents a program to simulate a musical synthesizer

This program allows your computer to simulate a musical synthesizer. Up to 10 different sounds may be defined and used to play on any or all three of the 64's voices. Each voice has a range of eight octaves and each can be turned on or off.

The main menu of the program prompts you to define a sound, save it to memory, and then play any combination of the defined sounds on the keyboard.

Program Notes

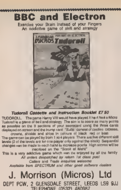
lines	
30-50	set up variables, arrays & memory locations
60-110	print main menu
120	wait for a key to be pressed
130	GOSUB to a routine depending on the key pressed
1000-1999	subroutines for defining a sound
3000-3999	reset a voice subroutine
4000-4999	save a sound subroutine
5000-5110	musical keyboard subroutine
10000-10070	menu for defining a sound
20000-20020	program title subroutine
30000-30020	binary – decimal conversion
40000-40040	decimal – binary conversion
50000-50090	input number in binary routine
60000-60190	data for machine code
60020-60400	place data into memory

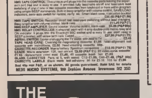
Basically the machine code routine is used to convert keyboard entries into frequency values needed to produce a sound. The frequencies for the base octave, octave 0, can be found in lines 60195-60196, as they appear in the *Programmers Reference Guide*. These values are different to the ones in the *Users Guide* and may be used instead.

```
SUPER SID

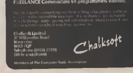
10 REM "SUPER SID  FOR          //      10 REM ------------     THE     // !
15 REM "BY   PAUL          CBM / \-+    15 REM ------------             \_/ !
20 POKE53280,14 POKE53281,6 POKE646,14
26 IFPEEK(50176)=130THEN30
27 PRINT "PLEASE WAIT - LOADING DATA" GOSUB60200
30 SID=54272 MEM=49152 SO=0
40 DIMA(16),N$(9)
42 FORT=0TO9 N$(T)="          " NEXT
45 FORT=0TO2 POKET00+T,0 POKE171+T,1 NEXT
47 POKE165,5 POKE166,5 POKE167,5
49 POKE173,0 POKE174,0
50 FORI=1TO15 A(I)=0 NEXT
60 GOSUB20000
80 PRINTTAB(15)"M/\/  \-/------------"
90 PRINT "D - DEFINE SOUND" PRINT "R - RESET VC"
100 PRINT "S - SAVE SOUND" PRINT,"M - MUSICAL KEYBOARD" PRINT,"Q - QUIT
PROGRAM"
110 PRINT,"SELECT 1 TO 5"
120 GETIN$ IFIN$<"A"ORIN$>"E"THEN120
130 ROUTE=ASC(IN$)-64 ONROUTEGOSUB1000,3000,4000,5000
140 IFROUTE=5THENCLR PRINT"" LIST-15
150 GOTO60
1000 GOSUB20000 GOSUB10000 PRINT"" FORI=1TO10 PRINT,,,A(I) NEXT
1004 GETIN$ IFIN$<"A"ORIN$>"Q"THEN1000
1005 ROUTE=ASC(IN$)-64 ONROUTEGOSUB1020,1030,1040,1050,1060,1070,1080,1090,1100
1006 IFROUTE<10THEN1000
1007 ONROUTE-9GOSUB1110,1120,1130,1140,1150,1160,1170
1008 IFROUTE=17THENRETURN
1009 GOTO1000
1020 A$="FREQUENCY LOW" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1022 PRINTTAB(12)"" BIN$ S=7 E=0 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1030 A$="FREQUENCY HIGH" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1032 PRINTTAB(12)"" BIN$ S=7 E=0 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1040 A$="PULSE WIDTH LOW" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1042 PRINTTAB(12)"" BIN$ S=7 E=0 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1050 A$="PULSE WIDTH HIGH" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1052 PRINTTAB(12)"" BIN$ S=3 E=0 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1060 A$="WAVEFORM(17 33 65 129)" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1062 PRINTTAB(12)"" BIN$ S=7 E=0 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1070 A$="ATTACK" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1072 PRINTTAB(12)"" BIN$ S=7 E=4 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1080 A$="DECAY" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1082 PRINTTAB(12)"" BIN$ S=3 E=0 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1090 A$="SUSTAIN" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1092 PRINTTAB(12)"" BIN$ S=7 E=4 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1100 A$="RELEASE" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1102 PRINTTAB(12)"" BIN$ S=3 E=0 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1110 A$="FREQUENCY CUT OFF LOW" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1112 PRINTTAB(12)"" BIN$ S=2 E=0 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1120 A$="FREQUENCY CUT OFF HIGH" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1122 PRINTTAB(12)"" BIN$ S=7 E=0 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1130 A$="RESONANCE" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1132 PRINTTAB(12)"" BIN$ S=7 E=4 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1140 A$="FILTER" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1142 PRINTTAB(12)"" BIN$ S=3 E=0 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1150 A$="FILTER MODE" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1152 PRINTTAB(12)"" BIN$ S=7 E=4 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1160 A$="VOLUME" GOSUB1900 DEC=A(ROUTE) GOSUB40000
1162 PRINTTAB(12)"" BIN$ S=3 E=0 GOSUB50000 GOSUB30000 A(ROUTE)=DEC RETURN
1170 FORT=1TO16 A(T)=0 NEXT RETURN
1900 PRINT""A$ FORI=1TOLEN(A$) PRINT"-", NEXT PRINT
1999 RETURN
3000 A$="RESET VC" GOSUB1900
3010 INPUT "WHICH VOICE(1 2 3)",VC IFVC<1ORVC>3THEN3000
3020 FORT=SID+((VC-1)*7)TOSID+((VC-1)*7)+6 POKET,0 NEXT
3999 RETURN
4000 GOSUB20000 PRINT""TAB(15)"SAVE" /------------" R=10
4002 FORI=0TO4 PRINTI,N$(I),I+5,N$(I+5) NEXT
4005 PRINT"  PRESS  1  TO SELECT SOUND NUMBER." POKE650,128
4007 PRINT""TAB(9) "CARRIAGE RETURN TO END"
4010 PRINT ""TAB(15)CHR$(R)"-1 ---     "SO
4020 GETIN$ IFIN$=""THENSO=SO+1
4021 IFSO=10THENSO=0
4025 IFIN$=CHR$(13)THEN4050
4030 IFC=5THENR=146
4032 IFC=0THENR=18
```

```
4034 PRINT"TTT" C=C+1 IFC=10THENC=0
4040 GOTO4010
4050 POKE650 0 V=SO*11
4055 INPUT"■NAME OF SOUND" N$(SO) N$(SO)=LEFT$(N$(SO),9)
4057 IFLEN(N$(SO))<9THENN$(SO)=N$(SO)+" " GOTO4057
4060 POKEMEM+V A(1) POKEMEM+V+1 A(2) POKEMEM+V+2 A(3) POKEMEM+V+3,A(4)
4065 POKEMEM+V+4 A(5) REM WAVEFORM
4070 POKEMEM+V+5 A(6)+A(7) REM A/D
4080 POKEMEM+V+6 A(8)+A(9) REM S/R
4090 POKEMEM+V+7 A(10) POKEMEM+V+8,A(11) REM CUT OFF
4100 POKEMEM+V+9 A(12)+A(13) REM FILT
4110 POKEMEM+V+10,A(14)+A(15) REM VOL
4120 RETURN
5000 GOSUB20000 PRINTTAB(12)"\ ▬ ▬L ╱ |Γ_"
5010 PRINTTAB(11)"▬▬▬▬▬▬▬▬▬▬"
5020 PRINTTAB(11)"■ ■ ■ ■ | ■ ■ ■ |■■" PRINTTAB(11)"■ ■ ■■ ■■ | ■■ ■■ ■■ |
■■"
5030 PRINTTAB(11)"■ ■ ■ ■ | ■ ■ ■ |■■" PRINTTAB(11)"■■Z|X|C|V|B|N|M| ■"
5040 PRINTTAB(11)"■ ■ | | | | | | | ■"
5050 PRINT"■"TAB(11)"_1 - ╳Γ─ 1 Γ╱Γ_" PRINTTAB(11)"_3 - ╳Γ─ 2 Γ╱Γ_"
5060 PRINTTAB(11)"_5 - ╳Γ─ 3 Γ╱Γ_"
5070 PRINTTAB(10)"▬| - ─╱─L ●Γ╱● " PRINTTAB(5)"╱─ ■ +-£ - ●L─| ╳Γ─ Γ-|■X
─ ╱ "
5080 PRINTTAB(5)"╱─ ■ 1-3 - ●L─| ╳Γ─ ●Γ╱(0-9)" PRINTTAB(12)"● - ● ^|"
5090 PRINT"■■OCTAVE" "SOUND" "VOICE 0=OFF 1=ON"
5095 PRINT"■■─────" ,"────"," ────"
5096 POKE255,192 POKE253,212 POKE251 64 POKE252,0 POKE254,0
5099 SYS50176 REM ENTER MACHINE CODE
5100 FORW=0TO2
5102 PRINT"■■■  ■■■ PEEK(165+W) "   ■■■ PEEK(168+W)N$(PEEK(168+W))
5103 PRINT    ■■■"PEEK(171+W) NEXT
5105 IFPEEK(251)=62THENSYS50169 FORI=1TO10 GETIN$ NEXT POKE198,0 RETURN
5110 PRINT"TTTT" GOTO5100
10000 PRINT"■■■■■"TAB(15)"EFINE SOUND■■■■■■■■■■■■─────────"
10010 PRINT "● - ▬REQUENCY LO"
10020 PRINT,"1 - ▬REQUENCY HI" PRINT "- PULSE WIDTH LO"
10030 PRINT "- - ▬ULSE WIDTH HI" PRINT, " - WAVEFORM" PRINT,"_ - ●TTACK"
10040 PRINT,"1 - ▬ECAY" PRINT 1 - ●USTAIN PRINT - ▬ELEASE"
10050 PRINT "` - ▬UT OFF LO" PRINT,"╱ - ▬UT OFF HI" PRINT "L - ▬ESONANCE"
10060 PRINT "、 - ▬ILTER" PRINT "╱ - ▬ILTER MODE" PRINT,"Γ - ╳OLUME"
10065 PRINT "7 - ▬ESET VALUES" PRINT,"● - ●UIT
10070 RETURN
20000 PRINT"■"TAB(9)"┌──────────────┐" PRINTTAB(9)"|>>>>╱●╱Γ_ ●─<<<<|
20010 PRINTTAB(9)"└SOUND EXPERIMENTER ┘" PRINTTAB(9)"■└──────────────┘■"
20020 RETURN
30000 REM BINARY - DECIMAL
30010 DEC=0 FORI=8TO0STEP-1 DEC=DEC+VAL(MID$(BIN$,8-I+1,1))*2↑I NEXT
30020 RETURN
40000 REM DECIMAL - BINARY
40010 BIN$="" FORI=7TO0STEP-1
40020 IFDEC-2↑I>-1THENDEC=DEC-2↑I BIN$=BIN$+"1■" GOTO 40040
40030 BIN$=BIN$+"0■"
40040 NEXT RETURN
50000 REM BINARY INPUT
50010 T=12 B$="■■■■■■■■■■■■■" BIN$=""
50030 PRINTLEFT$(B$,9)TAB(11)"┌─┬─┬─┬─┬─┬─┬─┬─┐" PRINTTAB(11)"| | | | | | | | |"
50040 PRINTTAB(11)"└─┴─┴─┴─┴─┴─┴─┴─┘"
50050 PRINT"■■ INPUT EITHER A '1' OR '0' FOR EACH BIT"
50052 K2=0 K1=E-1 IFS<4THENK2=S+1 K1=7
50053 IFK1<0THEN50060
50054 FORQ=K1*2TOK2*2STEP-2 PRINTLEFT$(B$,10)TAB(T+14-Q)"■ ■" NEXT
50060 FORI=S*2TOE*2STEP-2 PRINTB$TAB(T+14-I)"↑"
50070 GETIN$ IFIN$<"0"ORIN$>"1"THEN50070
50080 PRINTLEFT$(B$,10)TAB(T+14-I)IN$ BIN$=BIN$+IN$ PRINTB$TAB(T+14-I)" " NEXT
50090 RETURN
60000 REM MACHINE CODE DATA
60010 DATA120 169 156 162 26,141 21 3,142 20,3,88,96,120 169 234,162 49,141 21 3
60015 DATA142 20 3,88 96
60020 DATA165 197,197 251,208,25 133 251,201 64 240,16,201 40,208,10 230 165
60025 DATA165 165,201 0 208 4,169 0,133 165 76 49,234 76,113,197
60030 DATA201 43 208 15 208 166 165 166,201 0,208,4,169,0,133 166,76,49,234
60040 DATA201 40 208 15 230 167 165 167 201 0 208 4 165 0,133,167 76,49,234
60050 DATA201 62 208 3,76 49,234 201 4 208 9 165 171 73,1 133 171,76 49 234
60060 DATA201 5 208,9 165,172 73,1,133 172 76 49,234,201,6,208 9 165,173,73,1
60065 DATA133,173 76 49 234
60070 DATA201 1 208 14 162 0,130,157 0 212,222,224,29,208,248,76,49,234
60080 DATA201 56,208 15 230 168,165 168 201,10 208 4,169,0,133,168,76,49,234
60090 DATA201 59 208 15 230 169 169,169 201 10 208 4,169,0,133 169,76,49,234
60100 DATA201,8,208 15 230 170,165 170 201 10,208 4 169,0,133,170 76,49 234
60110 DATA162 0 165 251 221 137 197 240 8 232,224,13,208,246,76,49,234
60120 DATA138 10,133 5 32 176 197 234 234 234 234 234,234,234 234
60125 DATA160,0 134 2 166 2 181,171,208 3 76,99 197
60130 DATA166 5 189,190 197 133 179,232 189 190,197 133 179 166,2 181,165,170 24
60135 DATA6 178 38 179 202,208 248
60140 DATA150 2 160 0 152 24,117 168,200,192 11 208,248,133,254
60150 DATA160 0 165 178 145,254 200 165,179,145 254,166 2,169,0 224 0 240,6 24
60155 DATA105 7 202 144 246,133 252
60160 DATA160 7,177 254 153,14 212,200 192,11,208 246,160 0 177,254,145,252 200
60165 DATA132 7 208 247
60170 DATA230 2 165 2,201,3,208 3 76,255 196,76 49 234
60180 DATA162 0 165 251,221,137 197 240,8 232,224,13,208,246,76,49,234
60185 DATA138 10 133 5 76,231,196
60190 DATA12 13 23 18 28 31,26 28,29,39,34,36,47
60195 DATA1 12,1,28 1,69 1,62,1,81 1 102 1,123,1 145 1,169,1 195,1 221,1 200
60196 DATA2 24
60197 DATA162,0 134,2 160,2,181 171 240 18,169,0 224 0 240 6 24,105,7,202
60198 DATA144,246 170 169,0,157,4 212,230 2,165,2,201,2,208 224,96
60199 DATA-1
60200 MC=50176
60300 READA IFA=-1THENRETURN
60350 PRINT"■■■■", MC
60400 POKEMC A MC=MC+1 GOTO60300
```

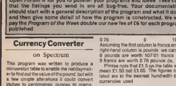

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Currency Converter

on Spectrum

This program was written to produce a conversion table to enable the holidaymaker to find out the value of the pound, but with a few simple alterations it could convert inches to centimetres, ounces to grams, miles to kilometres and in each case, vice versa

The program allows you to make a copy of the table on the ZX Printer

If you have never encountered a table of this type before, here is a brief explanation. Take for example the following line

0 76	9	107 01

Assuming the first column is francs and the right-hand column is pounds, we can see 9 pounds are worth 107 01 francs and 9 francs are worth 0 76 pounds (ie, 76p)

Please note that £1 5 on the table would mean £1.50 not £1.05. The figures calculated are to the nearest hundredth of the currencies used

Variables

n$	Name of foreign currency
r	Exchange rate
L	Length of n$
a	Control variable
p	Centre column figure on table
g	Line number to GO TO after menu selection.

Program notes

10	Set-up screen. *Poke 23693,56* = *Ink 0 Paper 7 Flash 0 Bright 0*
30	*At 0,0* is added to the *Input* to prevent the screen from scrolling up
30	*At 2,0 At 2,0* is not a mistake — the first *At 2,0* clears line 2 of the screen. n$(*To* (8 *And* L 8)+(L *And* L =8)) prevents the name of the foreign currency from spilling over onto the next line
90 and 110	Calculate and print values
130	Menu. *Print#0 At 0,0* prints the menu on the first of the bottom two lines
140	
170-180	*Goto* section corresponding to user's selection from menu
190	Copy table. *Input Inkeys* clears the bottom two lines
210	End program.
500	The *Data* corresponds with the centre numbers on the table. The numbers can be changed to suit individual needs

```
   1 REM  ┌─────────────────────┐
   2 REM  │ CURRENC  CONVERSION │
   3 REM  │─────────────────────│
   4 REM  │ © Andrew Wiseman 1983│
   5 REM  └─────────────────────┘
  10 POKE 23622,8  POKE 22693,56
 BORDER 0
  20 CLS   PRINT INVERSE 1
Currency Conversion Table   "
  30 INPUT AT 0,0," Enter the na
me of the currency"' LINE n$ LE
T L=LEN n$
  40 INPUT AT 0,0,"    Enter the
 exchange rate "' £1 = ",r: IF r
<=0 THEN GO TO 40
  50 PRINT AT 2,0,,AT 2,0, INK 2
,"  POUNDS",TAB 23,n$( TO (8 AND
 L>8)+(L AND L =8))
  60 RESTURE
  70 FOR a=1 TO 18
  80   READ p
  90   PRINT AT a+2,0,,AT a+2,3,(
INT ((1/r*p)*100+.5))/100,TAB 14
;
 100   PRINT INK 1,p,TAB 24,
 110   PRINT (INT ((r*p)*100+.5))
/100
 120 NEXT a
 130 PRINT #0,AT 0,0 "Press "R"
TO RE-RUN, "E" TO END,    or "C"
FOR A COPY."
 140 POKE 23658,8
 150 PAUSE 0
 160 LET i$=INKEY$
 170 LET g=(30 AND i$="R")+(130
AND i$="C")+(210 AND i$="E")
 180 GO TO (g AND g<>0)+(150 AND
 g=0)
 190 INPUT INKEY$  COPY
 200 GO TO 130
 210 STOP
 500 DATA 1,2,3,4,5,6,7,8,9,10,1
5,20,25,30,40,50,75,100
```

Currency Converter
by Andrew Wiseman

Open Forum

Alphasort

on Vic20

This program sorts into alphabetical order a number of words that are entered by the user.

Firstly type in the program and *Run* it. Then enter the number of words you wish to enter and sort. Next, enter the words one at a time. The correct alphabetical order will be displayed on the screen.

Program Notes

10-150 Instructions
190-230 Input words into array
240-310 Print sorted words
400-490 Subroutine to sort words

Variables

A Number of words
A(A) Size of array
C 3rd string variable used to swap two words in the array
B Current inputted word

```
10 PEM *** ALPHA-SORT ***
20 CLR
30 PRINT "□";TAB(12);"ALPHA-SORT"
40 PRINT TAB(12):"──────────"
50 PRINT:PRINT:PRINT
60 PRINT TAB(7);"THIS PROGPAM PRINTS"
70 PPINT
80 PPINT TAB(7);"OUT IN ALPHABETICAL"
90 PRINT
100 PRINT TAB(7);"ORDER THE WORDS (OR"
110 PRINT
120 PRINT TAB(7);"NAMES) YOU TYPE IN."
130 PRINT:PRINT:PRINT:PRINT:PRINT
140 PRINT "   PRESS THE SPACE BAR TO BEGIN"
150 GET A$:IF A$<>" " THEN 150
160 INPUT "□HOW MANY NAMES PLEASE ";A
170 IF A<=1 THEN 160
180 DIM A$(A)
190 FOR C=1 TO A
200 PRINT "□NAME";C:"IS ";:INPUT B$
210 A$(C)=B$
220 PRINT "□"
230 NEXT C
240 PRINT "□ALPHABETICAL ORDER IS..."
250 PRINT
260 FOR D=1 TO A
270 GOSUB 400
280 NEXT D
290 FOR E=1 TO A
300 PPINT A$(E)
310 NEXT E
320 PPINT:PPINT:PRINT:PRINT:PRINT
330 PPINT TAB(8)"ANOTHER GO ? (Y/N)"
340 GET B$:IF B$="Y" THEN 10
350 IF B$<>"N" THEN 340
360 PRINT "□BYE!!!"
370 END
400 REM
410 REM SUBROUTINE TO SORT WOPDS
420 PEM
430 FOR B=1 TO (A-1)
440 IF A$(B)<A$(B+1) THEN 480
450 C$=A$(B)
460 A$(B)=A$(B+1)
470 A$(B+1)=C$
480 NEXT B
490 RETURN
```

Alphasort
by Gavin Aitken



Russian Roulette

on ZX81

In this short 1K program, you have to pick 3 of the 6 chambers in the gun. If you pick the full chamber, you will see the gun fire.

Program notes
10 Variables
30-130 Main part
140-200 Full or empty chamber?
201-205 Gun fire

```
   1 REM RUSSIAN ROULETTE 1K  ZX
81
  10 LET N=INT (RND*5)+1
  20 CLS
  30 PRINT "RUSSIAN ROULETTE"
  40 PRINT AT 3,0,"IN THE GUN,TH
ERE ARE 6 CHAMBERS."
  50 PRINT "1 IS FULL,PICK ONE (
1-6)"
  60 FOR K=1 TO 3
  70 IF K=1 THEN PRINT "1ST",
  80 IF K=2 THEN PRINT "2ND",
  90 IF K=3 THEN PRINT "3RD",
 100 PRINT " GUESS PLEASE?"
 110 PRINT AT 15,10,"██████" AT 1
6,10,"  ██ ",AT 17,10"      █"
 120 INPUT I
 130 PRINT I," IS",
 140 IF I=N THEN GO TO 200
 150 PRINT " EMPTY."
 151 PAUSE 30
 160 CLS
 170 NEXT K
 180 PRINT "VERY WELL DONE,YOU S
URVIVED"
 190 STOP
 200 PRINT " FULL,YOU DIE"
 201 FOR A=9 TO 0 STEP -1
 202 PRINT AT 15,A,"< "
 203 PAUSE 5
 204 NEXT A
 205 PRINT AT 15,0,"X"
```

Russian Roulette

Microradio

GW6JJN

Dragon interpretor

Many of you will remember that *Microradio* recently covered the subject of NOS Basicode 2 which, if implemented on your computer in the form of an interpreter program, would make your computer compatible with a host of other makes of machine. This is, of course, ideal for radio-computing enthusiasts since it means that they can send and receive data and programs over air almost irrespective of the computer at each end.

The good news this week is for Dragon Users. The prolific Grosvenor Software, who produced the excellent G4BMK RTTY program, has now produced a Basicode interpreter for the Dragon. This means that the Dragon will join the Commodore and BBC users who can enjoy not only Basicode communications, but the benefit of free software transmitted by the BBC Radio program *Chip Shop* among other stations around the country. If you can receive Dutch radio, free programs are also transmitted by the *Hobbyscoop* programme on NOS Radio Netherlands.

On the subject of Grosvenor Software, they have sent me a Morse Code Transceive program for the Dragon which I will review when I receive the necessary interface. If this program measures up to the RTTY program they produced, then a new world will be opened up to Dragon users. Don't forget that you don't need an amateur radio licence, or any licence for that matter, to receive radio signals. Any Dragon owner who has or can borrow a short wave radio receiver can receive RTTY as well as morse.

If you do not have a Dragon, don't worry since there are programs available for most micros. Those of you who are a little tired by games might like to try decoding some of these signals. There is everything from weather ships and oil tankers to the big news agencies and satellites that you can decode on the micro in your own home. This was never so easy before the advent of home computers and plugging in a radio receiver will connect your computer to the real world outside at very little cost. It will also lead to the exciting hobby of amateur radio if you're not too careful.

Grosvenor Software can be reached at 22 Grosvenor Road, Seaford, E Sussex. Staying on the subject of Dragons, those of you who read our sister magazine, *Dragon User*, will have heard of Dragnet. It is a group of amateurs with Dragon Computers who meet each Sunday Morning at 11.00am on 144.525Mhz to discuss things like the possibilities of using their micros within the radio hobby. It can be heard over a wide area of the East Midlands so, if you are of a like mind then I'm sure you will be welcome either to listen or to join in.

I am constantly surprised by the number of people who use Dragon micros as RTTY terminals or simply as radio helpmates for tracking satellites or learning morse. If you have any programs in this line, *Microradio* will be pleased to hear from you.

Ray Berry GW6 JJN

Arcade Avenue

Jetset Willy

The most exciting news of the last couple of weeks must be the release of *Jetset Willy* — the follow up to Software Projects' excellent *Manic Miner*. It's almost not worth while reviewing *Jetset Willy* since the program is inevitably going to reach number one in the charts. For what it's worth Matthew Smith has produced a sixty screen marvel that dwarfs most other arcade games produced for the Spectrum and retains all the sense of fun and originality of *Manic Miner*. In the next few weeks I plan to take a look at some of the other games produced by Software Projects to see how they rate. I am sure it's a company we will hear more of in the future.

Whilst on the subject of M M here is a neat program from John Dutchman Smith of Wigan that brings together a couple of the 'cheat' routines for *Manic Miner* that some of you may have missed. As a bonus the listing allows you to modify and alter the screen titles to read anything you would like (within a 32 character size maximum). So if you know someone who looks uncannily like Eugene Evans, or even a Kong beast, you can give them a special treat (?) the next time they visit.

The published listing allows you to select screens on the old Bug-Byte versions but the word from the horse's mouth is that to produce the same effect on the Software Projects' edition you must type the word *TYPEWRITER* holding the 9 key down before you can enter the short numeric codes for each different screen. That's it for this week — write in and tell me what the best arcade games are for your machine, tell me about the rubbish too!

Tony Kendle

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments, from playing tips on difficult games or programs you'd particularly like to praise (or blame!) then write to: Tony Kendle, Arcade Corner, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

```
  10 REM MANIC MINER NEW TITLES
  20 REM : J.S.DUTCHMAN-SMITH
  30 PAPER 7: INK 1: BORDER 7: C
LS
  40 CLEAR 32767
  50 PRINT AT 6,0: LET O$="LOAD
 MANIC MINER TAPE AND WAIT": GO
 SUB 1000: PRINT : LET O$="F
OR Bytes MM2 TO LOAD.": GO SUB
1000
  60 LOAD "MM2"CODE 32768,32768:
 CLS
  70 CLS : PRINT AT 4,0: LET O$=
"           OPTIONS": GO SUB 10
00: PRINT
  80 LET O$="     1 ENTER NEW TIT
LES": GO SUB 1000: PRINT
  90 LET O$="     2 ENTER NEW HEA
DINGS": GO SUB 1000: PRINT
 100 LET O$="     3 SAVE TO TAPE
": GO SUB 1000: PRINT
 110 LET O$="     4 PLAY THE GAME
": GO SUB 1000: PRINT
 120 LET O$="     5 PROTECT LIVES
": GO SUB 1000: PRINT
 130 LET O$="     6 PRACTICE INST
RUCTIONS": GO SUB 1000: PRINT
 140 IF INKEY$="1" THEN CLS : GO
TO 190
 150 IF INKEY$="2" THEN CLS : GO
TO 360
 160 IF INKEY$="3" THEN SAVE "MM
2"CODE 32768,32768: CLS : GO TO
70
 170 IF INKEY$="4" THEN RANDOMIZ
E USR 33792
 172 IF INKEY$="5" THEN CLS : GO
TO 500
 174 IF INKEY$="6" THEN CLS : GO
TO 600
 180 GO TO 140
 190 FOR F=45568 TO 65024 STEP 1
024
 200 PRINT : PRINT
 210 PRINT TAB 12;"SCREEN ";(F/10
24-43.5)
 220 FOR A=0 TO 31: PRINT CHR$ P
EEK (F+A);: BEEP .01,0: NEXT A:
BEEP .05,24
 230 INPUT "ENTER NEW TITLE (< 3
2 CHARACTERS)TO LEAVE UNCHANGED P
RESS ENTER";A$
 240 IF A$="" THEN GO TO 330
 250 IF LEN A$>32 THEN GO TO 230
 260 LET B$="                "(
TO (16-LEN A$/2)): REM 16 SPACES
 270 LET C$="                    
            "( TO 32-LEN (A$+B$)):
    REM 32 SPACES
 280 LET O$=B$+A$+C$
 290 GO SUB 1000
 300 FOR A=0 TO 31
 310 POKE (F+A),CODE O$(A+1)
 320 NEXT A
 330 BEEP .05,24
 340 NEXT F
 350 GO TO 70
 360 INPUT "ENTER HEADING (<92 C
HARACTERS)";A$
 370 IF A$="" THEN DIM H$(96): F
OR A=1 TO 92: LET H$(A)=CHR$ PEE
K (40191+A): NEXT A: GO TO 410
 380 LET B$=" . . . . . . . . . .
. . . . . . . . ": LET C$=B$+B$+B$(
TO 28)
 390 LET H$=". . "+A$+C$( TO 92-
LEN A$)
 400 FOR A=1 TO 96: POKE 40191+A,
CODE H$(A): NEXT A
 410 PRINT AT 14,0: FOR F=1 TO 3:
 LET O$=H$(((F-1)*32)+1 TO F*32
): GO SUB 1000: PRINT : NEXT F
 420 PAUSE 50
 430 GO TO 70
 440 STOP
 500 PRINT AT 8,0: LET O$="
   SELECT OPTION": GO SUB 1000:
PRINT
 510 LET O$="     1 LIFE PROTECTI
ON ON": GO SUB 1000: PRINT
 520 LET O$="     2 LIFE PROTECTI
ON OFF": GO SUB 1000: PRINT '
 530 IF INKEY$="1" THEN POKE 351
36,0: CLS : GO TO 70
 540 IF INKEY$="2" THEN POKE 351
36,53: CLS : GO TO 70
 550 GO TO 530
 600 PRINT : LET O$="HOW TO O
BTAIN PRACTICE SCREENS": GO SUB
1000: PRINT
 610 LET O$="YOU CAN OBTAIN WHIC
HEVER SCREEN": GO SUB 1000
 620 LET O$="YOU WISH IN THE FOL
LOWING WAY": GO SUB 1000: PRINT

 630 LET O$="START THE GAME AND
PRESS ENTER": GO SUB 1000
 640 LET O$="NEXT KEY IN THIS NU
MBER 6031769": GO SUB 1000
 650 LET O$="IF CORRECTLY KEYED
IN A BOOT": GO SUB 1000
 660 LET O$="WILL APPEAR. TO SEL
ECT A SCREEN": GO SUB 1000
 670 LET O$="PRESS TOGETHER THES
E KEYS": GO SUB 1000: PRINT
 675 RESTORE 730
 680 FOR N=1 TO 20
 685 LET N$=STR$ N: IF N<10 THEN
 LET N$=" "+N$
 690 READ D$
 700 LET O$="SCREEN "+N$+"    "+D$

 710 GO SUB 1000: POKE 23692,255:
 NEXT N
 715 INPUT "COPY ? (Y/N) ";Z$: I
F Z$="Y" THEN COPY
 720 GO TO 70
 730 DATA "    ","    1","    2"
,"    21","    3","   31","   32"
,"  321","    4","   41","   42"
," 421","  43","  431","  432"
," 4321","   5","   51","   52"
," 12345"
1000 FOR A=0 TO LEN O$-1: PRINT
TAB A;O$(A+1);: BEEP .01,0: NEXT
 A: BEEP .05,24: RETURN
1010 SP E "P,IAC LINE 10
```


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Tony Bridge's Adventure Corner



The Quill

To start this week, some more *Knight's Quest* problems. Mike Young and his daughter Sarah are currently stuck in the stone chamber. You're right, Mike, in getting your squire to pull the lever.

"First, how do I get him to let go of the lever? I would hate to think of him stuck there for the rest of the adventure! Second, how do you get down the sheer drop without killing yourself — there doesn't seem to be anywhere to tie the rope. Third, having got to the lake, how do you release the boat to get out onto the lake itself? Do we need the dwarf to help here?"

Using the Corner Code, try these two clues for your first two questions:
RCRA / OLPL / ETAH / NEDO / CWLA / IRMF / B★DL / COWN / NE

As for the boat — well, you could try a bit of knitting (you know, knit one, pearl one)!

It's nice to know that you have such regard for the dwarf, that's why I like this particular adventure, it has such a good feeling of atmosphere. But you will certainly need the good dwarf at a later stage (at this point you have got about a quarter of the way through the adventure). Mike continues:

"Let me thank you for your recent clue for Artic's *Ship of Doom*. This was just what we needed and have since managed to complete the whole adventure. Personally, I feel the Artic's Adventures are not as difficult as they are sometimes made out to be (this one seemed easy compared with K's Q), although we are currently stuck in *Golden Apple* at the ghostly shadow."

Thanks, Mike! As a bonus then, try turning off the lamp when you see the shadowy form — you never know, he might not see you then!

Don Cook of Leeds is trying to rescue the Princess with a "jewelled weapon" — that's the diamond spear, Don, which you'll need to kill the eagle. But I won't spoil your fun and tell you where it is (not this week, anyway!). And rescuing the Princess is not, as in so many other adventures, the end of the matter, being only a little further on from the Young's position.

Finally, Simon Clark, of Watford, is also having trouble with that pesky Princess in another location, the water-logged dungeon, in which he keeps getting drowned. You are going to have do a bit of work, Simon, in translating those symbols that you see. Then try saying the word that you come up with. It's a nonsense word, in the same vein as plugh and Y2 and others that crop up in various classic Adventures; they all have one function — to magically transport the player from one place to another. We'll return to good old *Knight's Quest* at a later date — now on with the HHOF. The first name this week is:

David Bead, with a score of 71% after weeks of toiling (just like the rest of us!)
Simon Field of Wokingham — and thanks very much for the map, which I once, rashly I admit, said was near impossible to draw. Well, I did say "near", Simon!

Sarah and Simon Drury, and their father Trevor. I'm glad to see you have so much fun playing it even after completing it (one of the things that makes this adventure so enjoyable and worthwhile) — I hope you have as much fun with *Valhalla*.
O Gardarsson, from Reykyavik in Iceland. He has also completed Artic's A,B,C and D and is now working through E, *Golden Apple*. Other adventures you might like to look at, Mr Gardarsson, are the *Mysterious Adventures* from Channel 8, which are very like the Scott Adams series, also available now for the Spectrum.
Thomas Turnbull, of Ashington, on his CBM 64, with 85% and 77.5%. Thomas has seen the bird hit the dragon with his bow, and stab it with his arrow! More HHOF another week!

Most of you will, by now, have heard of *The Quill*. This is an adventure creation program from Gilsoft, available for the Spectrum, and soon for the Commodore 64.

When I first mentioned the program, some months ago, I expressed the hope that it would free many people from the worry of coding their adventures, and allow full reign to their imagination in composing worthwhile adventures. I'm glad to see that this has happened!

Denis through the Drinking Glass was the first *Quill'd* program I saw, and this adventure, written in witty verse, is, of course, about the first man of the land, Mark Thatcher's father. The follow up is just about with us, and is called *The Tebbit* (that's one software author who won't be getting his MBE in the next Honour's List)!

The second tape that I came across was *Mindbender*, and this one I also enjoyed a great deal. It has since been taken over, for marketing purposes, by Gilsoft themselves, and features in their new Gold Collection of *Quill'd* adventures. Other titles include *Barsak the Dwarf*, *Africa Gardens*, *Spyplane* and *Diamond Trail*.

Quill'd adventures all tend to have the same feel — they are text, with a similar layout and responses. And if you answer 'No' to the inevitable "Play Again?", the program says "Bye" and self-destructs on the next keypress. I must admit that this does not worry me in the slighest — I am more interested in the author's imagination in setting up novel situations. And being freed from the yoke of coding his adventure, the author can use *The Quill* to full advantage.

Several tapes have been sent to me in recent weeks from proud adventure-writers, using Gilsoft's *Quill*.

The first one out of the bag (and there is no hidden meaning to the order in which I tackle these) is *The Lost Gnomes*, merely the first in a series of Eric Bean adventures. Written by one C K Bozicek, it concerns a wily gnome called, you guessed it — Eric Bean. That's you, the player, and your task is to get all your friends and the stolen treasure back to your home.

A sample vocabulary is given in the on-screen instructions before the game begins (a good point this), and the input during play follows the usual *Quill* format, of verb followed by a noun (although the program will make a stab at recognising longer sentences), and all the usual commands are recognised (*Get Ferret*, *Drop Rock* and so on — whoops, a couple of free clues there). There are some 130-odd locations, which seems pretty good value as the puzzles are nice and tough. A charming adventure which will prove really entertaining for the adventure fan.

ERIC BEAN ADVENTURES
9 ST LUKE'S CLOSE
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NORTHANTS

More Quill'd adventures next week

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So if you have an Adventure you want reviewed, or if you're stuck in an Adventure and cannot progress any further, write to Tony Bridge, Adventure Corner, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 3LD.

Peek & Poke



PHONE MODEM

H Willis of Kingswood, Buckdon, writes

Q **I have a Dragon 32, and I have heard about phone modems and acoustic couplers I would like to know what they are and are they available for my Dragon? If so, what could I then do with it?**

A There are two main types of modem one plugs directly into the telephone system and is often called a phone modem (or hardwired modem) and the other fits over the telephone handset and is normally referred to as an acoustic coupler

Various modems are available for the Dragon 32, Tandata and Prism are two manufacturers who provide suitable equipment If you connect your Dragon up to a modem this will allow you to make use of services such as Prestel, but not yet Micronet

LOGO GRAPHICS

J Manacara of Rose Hill Mauritius writes

Q **I recently acquired a 48K Spectrum and I am really delighted with it However I have been wondering about the logo graphics on the introduction cassette. I know it is in machine code but the programming manual has only a short chapter on m/c. Can you recommend a good book on machine code programming and the address of the supplier?**

Last week a friend coming from England brought me *Jetpac*. I have really enjoyed playing this and I have scored 18,750 up until now However I do find it awkward to control it from the keyboard so I would like to have some information on joysticks and their interfaces. Your opinion will be much appreciated.

A *Spectrum Machine Language for the Absolute Beginner*, written by William Tang and published by Melbourne House is one of the better introductory books on machine code Melbourne House can be contacted at Church Yard Tring Hertfordshire England

As far as joysticks are concerned there are a great many on the market suitable for the Sinclair Sectrum If you want one that will be suitable for any game then you should buy one of the programmable" joystick such as the one produced by Cambridge Computing They can be contacted at 1, Ditton Walk, Cambridge, England

STEP BY STEP ANSWER

J Lewis of Spalding Lincs writes

Q **Please help! I recently purchased a Sinclair Spectrum 48K and cannot get a program onto tape I have done what I think is correct according to the instruction manual. The only time it seemed to work the blue/yellow lines, etc, appeared plus the O.K. signal, but when I rewound the tape and did *Load* "" etc, the program was lost. It may only be a minor misunderstanding of instructions but I am finding it frustrating Have you any simple step by step instructions?**

A You should connect up your cassette recorder to the Spectrum as normal, ie, ear to ear and mic to mic and then pull out the plug from your cassette ear socket

Now having typed in your program, type *Save* ' name' (and press *Enter*) and the *START TAPE* message should appear Now press Record & Play on your recorder, wait for about 10 seconds (until the header has fed through) and then press any key on the keyboard (except space) You should now get the flashing lines etc and then the O K message Reconnect the ear lead and rewind the tape Now use *Verify* 'name and try to read what has been written, without losing the program stored in memory If this does not work then try repeating the above, but with the leads switched around on *Save* ie ear from the Spectrum to mic on the recorder and mic on the Spectrum loose The leads should be as normal on *Load* or *Verify* If this still doesn t work — try borrowing another cassette recorder!

TWO BYTES MISSING

T Multon 23 Penn Drive, Denham Green, Bucks UB9 5JP, writes

Q **I have a Commodore Vic 20 and when I switch it on I get the expected '3583 Bytes Free' statement on the screen But if I type '?Fre(0)' I receive the answer '3581' Could you tell me if there is something wrong with my Vic, or if not, why there are two bytes less than is at first stated?**

A There is nothing wrong with your Vic The missing two bytes have been used by the *?Fre(0)* command

Anyway, what s two bytes between friends?

NAMES IN ORDER

W Grimes of Dagenham Essex writes

Q **I have a Sinclair ZX81 and require a program which will sort out names in alphabetical order There is a program in the Sinclair handbook but this only sorts two strings and I can do this without a computer Can you provide me with a program which when I enter a list of names will display them on the screen in alphabetical order?**

A The listing below will work up to 100 names each of up to 16 characters in length

```
10 DIM A$ (100 16)
20 LET N=1
30 PRINT "INPUT NAME OR "*" TO END"
40 INPUT A$ (N)
50 IF A$ (N) = "*" THEN LET N=N-1
GO TO 70
60 LET N=N-1 GO TO 40
70 IF N=0 THEN STOP
80 FOR I=1 TO N-1
90 IF A$ (I) A$ (I+1)
THEN LET B$=A$ (I)
LET A$ (I)=A$ (I+1)
LET A$ (I+1)=B$
LET I=I-1 IF I 0 THEN GO TO 80
100 NEXT I
110 FOR I=1 TO N PRINT A$ (I)
NEXT I
```

Lines 20 to 60 store the names input into the array A$

Lines 80 to 100 sort the array

Line 110 prints the array

VOICE PROBLEMS

L. Moran of Crumlin, Dublin writes

Q **I own a Dragon 32 computer and am having terrible problems with the *Computavoice* program I wonder if the Dragon users amongst your readers would send in a list of the words or sentences that they have made this program say Why don't you have a page every week devoted to Microtips for all micros? By the way, how do I get hold of British stamps so that I can enclose s.a.e's to reply to classified ads in your magazine?**

A Well all you talkative Dragon owners? What's all this about a page for micro tips? We ve got a whole magazine devoted to that subject at the moment

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```
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20        LD     BC,#1800
30 LOOP:  LD     A,(HL)
40        XOR    # FF
50        LD     (HL),A
60        DEC    BC
70        INC    HL
80        LD     A,B
90        OR     C
100       JR     NZ,LOOP
110       RET
```

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ZX 81, 16K Ram pack with 11 games 2 books manual, leads and boxed for £26 o.n.o. Phone 01-348 3308

Commodores for sale

CBM 64 SOFTWARE on disc and cartridge BC Basic/Buck Rogers/Choplifter/Pacman/Pogo Joe/Shuttle/Sammy Lightfoot and many others Worth £350 The lot for £150 Phone Maidstone (0622) 832020

VIC 20, C2N Cassette Unit, 32K switchable Ram pack £220 software 6 books, worth over £420 sell £200 ono Tel Orpington 37249

COMMODORE 64 Software Falcon Patrol Revenge of the Mutant Camels Pipeline Gridtrap Creators Revenge All originals £4 each. Doncaster (0302) 81672 after 6pm.

COMMODORE SUPER EXPANDER, £25 as new Many magazines Popular Computing Weekly Many issues Your Computer back issues. Comp and basic games Prices negotiable Tel Northwich after 4.30pm 782475

VIC 20 SOFTWARE. Arcadia, Frantic, Scramble Gridrunner Panic Mini-Kong Frogger Puckman Orbis Amok, Alien Blitz Crawler Multitron Cavern Fighter Space Rescue All originals. £3 each £40 lot. Contact Mike on 0272 28672

VIC 20 C2N, Joystick, 16K switchable ZX Printer and Interface Speech Synthesizer £700 of software including Llamasoft, Imagine and Anirog books and magazines. Sell for £250 or swap for CBM 64 and accessories. Tel TB 2458 after 6pm.

FOR SALE OR SWAP Vic 20 plus cassette and joystick and s/w All boxed £120 ono for Spectrum 48K. Also books for Vic 20 Tel Cadeall (09074) 3858 any time

COMMODORE 64 1701 Monitor 1541 Disc drive C2N unit, 1515 printer, boxed games and joysticks Cost over £1,250! Yours for only £500 the lot! Tel (0424) 420345

VIC 20, 4 slot switchable motherboard £20 Jetpac £4.50 Bewitched £4.50 Skyhawk £5 Escape MCP £4 Pirate Cove £6 Mission Impossible £6 Country Gaftern £6 Telephone 0283 219202 after 6.30pm.

LARGE NUMBER VIC 20 Games for sale at very low price since I've already sold my computer Phone 01-490 3171 for details after 5pm

For sale

48K ADD ON for £22 Hardly used Gerrards Cross 88771

48K ORIC I and all manuals basic and 14 one cassettes. £120 ono. Tel. 01-640 3848

SIMON'S BASIC for Commodore 64 £35 ono. Tel 01-661 2525 after 7pm
C8 FIDELITY 2600 and all accessories. Sell for £50 or will swap for hardware for CBM 64 and games will pay for originals. Tel 01 658 6843
ORIC 48K Cassettes for sale. Chess Zodiac, Oric Flight £3 each or 3 for £8. 4 Loraine House Acre Lane, Wallington Surrey SM6 7NX.
SPECTRUM KEMPSTON Joystick with interface. New at Christmas unwanted gift £18. Software Omelron 48K £4.50 Tel 0483 36980
WALTERS MICROSYSTEMS printer model WM2000 and screen dump programme. Unused. Recommended for use with BBC Micro. £350 ono. Phone 021 658 3637 evenings only
TRS-80 COMPUTER 16K. Only 6 months old. Complete with 2 games and manuals etc. Cost??? £100 ono. Tel 0474 58144 evenings only. Ask for Ian
LIGHT PEN for any issue or memory Spectrum. Includes interface and software to run. Cost??? £20-£25 ono or exchange for software. Tel 0474 81868. Ask for Ian evenings
ORIC I 48K and software worth £79. Also book, cost £220. Sell for £90. Tel Stafford (0785) 211445 after 4pm
JUPITER ACE FORTH computer with Video Interface £45. 9in b/w video monitor £35. Both for £75. Tel Guildford 573134
MICRODRIVE, 48K Spectrum Interface I. Software Chess 3D Assembler Disassembler also Eprom board with monitor. Microdrive and software as new £190. Tel Watford 23670 evenings.
LYNX 48K plus £36 software £175 ono. Help insolvent! Tel Windsor 67784
ORIC I 48K. Still under guarantee and good condition plus £100 of s/w £130. Tel 0572 3183
SPECTRUM S/W for sale. Many top titles all at knocked down prices. Towcester 51202.
JET PAC, COOKIE, Trans Am Ant Attack, £18. Hosen Valhalla Black Crystal £20 Tel Notts 258062.
FULLER MASTER UNIT for sale. £45 or best offer. Luke Roberts, 90 Oxford Gardens London W10. Tel 01 960 1278 and ask for Luke (after 6pm)
SPEECH SYNTHESISER for Oric I £30. Also 150 plus computer mags. Offers around £25? Also 30 x 2708 Eproms and 15 x CPU s/Periphs inc 6802/6821 (all used) offers £25? Andy 0602 818178 after 6pm
ORIC I 16K plus leads, manual and software including Ultra, Hopper, Invaders, Centipede, Harrier Attack and many more. All for £90 ono. Phone 02612 2367 after 6pm weekdays, any time at weekend
VALHALLA, Lunar Jetman Atic Atac Zzoom Fifth ETX Tron Game and other originals. Swap or sell. Send list to Antonio Sala Flat 3, Carrick Court, Port Mary Isle of Man.
FOR SALE OR SWAP over 100 Spectrum titles after wanted Jetset Willy to buy or swap. For further details send SAE to Simon, 9 Centm Close Arnold Nottingham NG5 6RL.
ORIC I 48K, 10 months old plus £70 of software and 3 books and manual worth £220. Sell for £140 Tel 061 633 1341
SHARP MZ80A includes tape deck and monitor. Hardly used. Boxed with manuals and £75 worth of software for only £380. Uckfield, Sussex. Tel Uckfield 2087
MICRODRIVE AND Interface I plus two cartridges with games and utilities £120 ono. Tel Whitcombe 3888
CASED PSUS SV20A, dual 15v5A, ABS computer cases, built 16K dynamic Ram board unused 6821 6522,

Wanted

SPECTRUM games to swap or sell including many titles. Call 01-937 1811 Robert.
DRAGON PROGRAMS to swap. Phone 04626 5521 after 4 pm
SWAP SPECTRUM SOFTWARE Many new titles including Pogo, Hurg, Trashman, Pedro. Call John after 6 pm on 01-470 8684
SWAP CBM 64 Lord of Time adventure for any other Level 9 or Digital Fantasia Adventures. Wizard (£6). Also swap/sell Siren City (£6) O-Level Phy and (£8) Tel (2196) 76199 after 4 pm
SWAP CHESS CHALLENGER voice computer for any 32 or 48K computer and player. Tel 01-508 7086
WANTED Reel to reel offers around £50. Ring 692 5354 after 4 pm
WANTED! 48K Spectrum or Dragon 32 desperately as little software as possible. No tape units. Willing to pay up to £90. If interested phone Ammanford 5644
VIC 20 games to swap, titles include Avity, Asteroids, Arcadia and lots more. Tel (028) 28664 after 5 pm
ORIGINAL software wanted. Send details to Tony, 22 Egerton Road, South Chorlton, M21 1YP. If you send tapes you must accept my price, none returned. Will give fair price!
SWAP ELECTRON SOFTWARE. Phone Harpenden (05827) 5252. After 5 pm. Ask for Ian
ZX-80 Wanted. If still in cupboard send proposition to R. Betz Chemin du Moulin 30 B-1328 Ohain Belgium. State if computer still working, postage paid
SWAP THE QUILL adventure designer for scratch at H V R G. Telephone 01-456 1874 anytime

Diary

Event	Venue	Dates	Admission	Organisers
Midland Computer Fair	National Exhibition Centre Birmingham B40	May 4-6 10.00am-6.00pm May 7 10.00am-5.00pm	£2.50 adults £1.50 children	Reed Exhibitions Surrey House Throwley Way Sutton Surrey 01-643 8040
Linslade Middle School Fair	Linslade Middle School Mentmore Road Leighton Buzzard	May 5 11.00am-5.00pm	60p	Linslade Middle School Leighton Buzzard (0525) 381084
Walthamsoft 84	Main Exhibition Hall Waltham Forest Technical College Forest Road, London E17	May 19 10.00am-5.00pm	£1.00	Waltham Forest Technical College 01-454 5038
Apple 84	Fulcrum Centre Slough	May 24-25 10.30am-5.30pm May 26 10.30am-8.00pm	£2.00 on door (free tickets in advance from organisers)	Database Publications 68 Chester Road, Hazel Grove Stockport 061-456 8383
5th International Commodore Computer Show	Novotel Hammersmith London	June 7-8 10.00am-6.00pm June 9 9.00am-5.00pm	£2.00 adults £1.00 children £3.00 family ticket	Granard Communications 4 Babmaes St, London SW1 01-930 5711
The Computer Fair	Hall D Earl's Court London	June 14 10.00am-8.00pm (trade and press only) June 15-16 10.00am-6.00pm June 17 10.00am-6.00pm	£3.00 adults £2.00 children & OAPs	Reed Exhibitions, Surrey House Throwley Way Sutton Surrey 01-643 8040
Micro Trade 84 (Trade only)	Barbican London	July 4-6 10.00am-6.00pm	Free	Montbuild Ltd, 11 Manchester Sq, London W1 01-486 1951
Electron and BBC Micro User Show	Alexandra Palace London	July 19-21 10.00am-6.00pm July 22 10.00am-4.00pm	£3.00 adults £2.00 children	Database Publications, 68 Chester Rd Hazel Grove Stockport 061-456 8383
Personal Computer World Show	Olympia 2 Hammersmith Rd London	Sept 19-22 10.00am-7.00pm Sept 23 10.00am-6.00pm	fee yet fixed	Montbuild Ltd 11 Manchester Sq London W1 01-486 1951
5th International Commodore Computer Show	Leeds Exhibition Centre Queens Hall Leeds	Sept 27-28 10.00am-6.00pm Sept 29 9.00am-5.00pm	£2.00 adults £1.00 children £3.00 family ticket	Granard Communications 4 Babmaes St, London W1 01-930 5711
Computer Graphics 84 (over 18s only)	Wembley Conference Centre London	Oct 9-10 10.00am-6.00pm Oct 11 10.00am-4.30pm	£5.00	Online Conferences, Pinner Green House Ash Hill Drive, Pinner Middlesex 01-868 4466
ZX Fair	Bison Sports Centre Bolton Lancashire	May 12 10.00am-5.00pm	75p adults 50p children	Northern Premier Exhibitions 18 South Parade Pudsey West Yorkshire 0532 552854

New Releases

FLIGHT AREA

Battle Flight is a flight simulation program for the Oric and Atmos-one of very few for the machine It looks very sophisticated including four different kinds of graphics display — the airfield, flight area map, 3D of runway on landing and views of approaching aircraft

The big problem with flight simulation programs that attempt to genuinely simulate a real aeroplane is the large number of controls required, which in the case of machines like the Oric and the Spectrum means a vast number of different keys to press

This fact, in conjunction with the natural complexity of flying a plane means that all early attempts at computer flight are likely to result in major crashes

Still it's worth persevering if only for the genuine pride you ll feel if you manage to fly a few miles Up, up and away

Program	*Battle Flight*
Price	*£4 95*
Micro	*Oric/Atmos*
Supplier	*Stour Computing* *16 Old Bridge Road* *Bournemouth*

PAINTED

Through the long passing years echoes of *Amidar* still abound — this time it's a version for the BBC B and is retitled *Crazy Tracer*

For those who don't know the game it involves moving a paint wheel around a screen trying to complete the outlines of squares to win points You are chased by the inevitable bugs that object to your having this harmless good time

The second screen — awarded if you paint in all the rectangles on the first, continues the theme but this time you must paint in the rectangles in one go otherwise you run out of paint and have to go back for more

It is of course, totally unoriginal but therefore retains the addictive power of the authentic version I'm surprised Acornsoft are not afraid of being sued

Program	*Crazy Tracer*
Price	*£9 95*
Micro	*BBC B*
Supplier	*Acornsoft* *4a Market Hill* *Cambridge* *CB23NJ*

FOLLOW SUIT

Bridge Player II is a souped up version of *Bridge Player I* (surprise surprise) which is the only Bridge playing program I've seen on any micro

My personal knowledge of Bridge amounts to the fact that in some places it's a bit like whist which I learnt on my grandmothers knee — I never got any further with Bridge because I didn't have a suit

Nevertheless after a full and frank discussion with several of my colleagues who do have suits I can offer you their comments

These seem to be extremely favourable "the fact that the computer completely reshuffles for each hand is a big plus point" "very good but bids conservatively" It knows something called Acol and won't allow you to make stupid moves A must for Spectrum owning Bridge players everywhere

Program	*Bridge Player II*
Price	*£8 95*
Micro	*Spectrum*
Supplier	*CP Software* *2 Glebe Road* *Uxbridge* *Middlesex UB8 2RD*

Pick of the week

SHOUT HELP!

The Greedy Dwarf is a BBC Text adventure from Goldstar which features, among other things, the most complex language analysis I ve seen since the *Hobbit*

Aside from the usual Verb Noun combinations — Take Rabbit Kill Frog etc. the program includes a wide range of adverbs and adjectives necessary to master the adventure example sentences include Carefully drop the flask of liquid, please and shout Help (which is what I usually end up doing)

The objective of the adventure is recover the king's stolen gems from the dwarf Arfa who stole them This means venturing into a maze of catacombs. The program to make me suspect we ll be hearing a lot more of this program

Program	*The Greedy Dwarf*
Price	*£9 95*
Micro	*BBC*
Supplier	*Darling Kindersley Software* *1 2 Henrietta Street* *London WC2E 8PS*

GOLD MEDAL

Olympics 83 is a beautifully packaged program for the Spectrum 48K from Storm soft ware It is not an arcade game but rather a vast interactive database of Olympic facts and figures

The package consists of three parts, two cassettes and a substantial booklet The idea is that you can use the database to analyse various aspects of past performance in the games — the program includes for example every gold medal winner since 1896

For such a specialised package the commands available for use of the data are very complex indeed — almost a language eg EVENT = DISCUS > TYPE = MEN > HISTORY means find all the results in the men s Discus events

Other commands will produce a pictorial representation — of medals won by each country for example The second tape allows for very much the same thing but allows you to enter the results as they happen in this year s games

For sports fans it should be a lot of fun A Commodore 64 version is expected

Program	*Olympics 84*
Price	*£14 95*
Micro	*Spectrum*
Supplier	*Storm Software* *Winchester House* *Sherborne* *Dorset DT9 4DJ*

MARAUDERS

If I knew what distinguished a great game from a lousy one I d make a fortune *Fire Ant* is basically a dodge obstacles maze type game but far from being tedious and boring it's excellent

You are an ant (a harsh judgement perhaps but there you are) and your one task in life is to rescue the Queen ant from an army of scorpions (antist?) This involves finding your way through a series of mazes and munching through walls

Obviously one element in the game is avoiding marauding scorpions, but what makes the game particularly successful is the way — like *Manic Miner*, some of the screens require some logical thought to

mastered it isn't merely speed of reactions

Technically there's nothing amazing here but if the game is enjoyable and addictive, which it is, this is hardly relevant.

Program	*Fire Ant*
Price	*£7 95*
Micro	*Commodore 64*
Supplier	*Mogul Communications 90 Regent Street London W1R 5PT*

ANIMATED

Matrix Jeff Minter's follow up to *Gridrunner* is now available, via Llamasoft's arrangement with Salamander, for the Spectrum

Salamander have produced versions of several of Jeff's games and whilst all have retained the high speed appeal of the originals none have been particularly well programmed — were it not for the sheer brilliance of the game design they would look absurd placed against an Ultimate offering

With *Matrix* things are looking up The speed of the original is maintained but here Salamander seem to have done an especially good programming job — characters are animated and the game has 20 levels of varied but intense action

Program	*Matrix*
Price	*£6 95*
Micro	*Spectrum*
Supplier	*Salamander Software 17 Norfolk Road Brighton East Sussex BN1 3AA*

NEW OWNERS

Recently Prentice Hall released a tape called *100 programs for the Spectrum* — now they have done the same for the Electron

In the Electron's case there may be a greater need for such a package — it's a much more recent machine than the Spectrum and consequently has a newer ownership, more likely to be looking for a lot of programs quickly

As I have said before, 100 programs for just over £10 means that none of the programs are marvellous, although some of them could be used as building blocks for larger, more substantial programs

Program	*100 Programs for the Acorn Electron*
Price	*£11 50*
Micro	*Electron*
Supplier	*Prentice Hall 66 Wood Lane End Hemel Hempstead Herts HP2 4RG*

HIDEOUS DETAIL

Mazacs, a game which was considered a classic on the ZX81 is now available on the Commodore 64 It is closely related to the Spectrum version that was released last year — being issued by the same company DK'Tronics

The idea of the game, which in many ways anticipated the *Atic Atac* style graphic adventures that are now so familiar, is to fight your way through a maze to a treasure chest Hindering your way is an army of strange spidery creatures portrayed in sickeningly hideous detail you can fight them if you have a sword and if you have the strength (did you find enough food?)

The other big problem is that you only get a brief indication of whereabouts the gold is hidden and have to memorise as much of the map as possible — the exception to this being provided by wretched prisoners who are strung up along the route, who can point you in the right direction

Program	*Mazacs*
Price	*£6 95*
Micro	*Commodore 64*
Supplier	*DK Tronics Unit 6 Shire Hill Industrial Estate Saffron Walden Essex CB11 3AQ*

EERIE APPEAL

Battlezone was one of the classic arcade games It used three dimensional line graphics in a tank versus tank game of tactics — red screen with line drawn tanks (done for memory reasons) actually gave the whole game an eerie appeal

3D Tankzone for the BBC does justice to the original, using high resolution wire graphics to create the same effects That said, the structure of the game is pretty simple — shoot anything that moves but don't get shot

Program	*3D Tankzone*
Price	*£8 95*
Micro	*BBC*
Supplier	*Dynabyte Software 31 Topcliffe Mews Wide Lane Morley Yorks*

SUBTRACTION

Mirrorsoft have issued the next batch of original software following a well received initial batch The two games *Count with Oliver* and *Look Sharp* are both educational aimed at the younger age ranges

Count with Oliver teaches counting combined with colour recognition in the first part, entitled Toyshop and teaches subtraction in the second section — Lollipops — as Oliver gradually stuffs himself (growing visibly fatter all the time)

Although there is nothing very staggering here in terms of approach, what Mirrorsoft are doing consistantly right is using the Spectrum's graphics to the full

Program	*Count With Oliver*
Price	*£7 95*
Micro	*Spectrum*
Supplier	*Mirrorsoft Holborn Circus London EC1P 1DQ*

ROLE PLAYING

Sunken City is a graphic adventure for the Dragon 32 It is single key press role playing, in style with your task within the game being to discover a legendary Sunken City

The game appears to be in Basic with only around five different commands available which probably makes the game unsophisticated by current standards But the proof is in the pudding

Program	*Sunken City*
Price	*£7 95*
Micro	*Dragon 32*
Supplier	*Slik Software 19 Sancroft Street London SE11 5UG*

New Releases is designed to let people know what software is coming on to the market If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases Popular Computing Weekly 12-13 Little Newport Street WC2R 3LD



Top 10

Spectrum*

1 (2) Jet Set Willy (Software Projects)
2 (1) Atic Atac (Ultimate)
3 (3) Chequered Flag (Psion)
4 (5) Hunchback (Ocean)
5 (8) Flight Simulation (Psion)
6 (4) Scuba Dive (Durrell)
7 (7) Pogo (Ocean)
8 (9) Cyrus IS Chess (Intelligent)†
9 (8) Lunar Jetman (Ultimate)
10 ( ) Alchemist (Imagine)

*All 48K except where noted. † 16K
(Figures compiled by WH Smith and Son, London)

BBC*

1 (–) Killer Gorilla (Program Power)
2 (4) Chuckie Egg (A&F)
3 (3) Daredevil Dennis (Visions)
4 (2) Fortress (Pace)
5 (6) 3D Space Ranger (Microbyte)
6 ( ) Dodgy Geezers (Computer Consultants)
7 (–) Dambusters (Alligata)
8 (1) Mr Wimpy (Ocean)
9 (7) Snooker (Visions)
10 (–) Cyclon Attack (A&F)

* All model B
(Figures compiled by Micro Management Ipswich 0473 59181)

Atari

1 (–) Zaxxon (Datasoft)
2 (3) Slinky (Cosmi)
3 (1) Warlock (Calisto)
4 (2) Rally Speedway (Adventure International)
5 (6) Saga 4 Voodoo Castle (Adventure International)
6 (–) Aztec Challenge (Cosmi)
7 (–) Savage Pond (Starease)
8 (9) Saga 5 The Count (Adventure International)‡
9 (8) Enchanter (Voodoo)†
10 (–) Time Warp (English Software)

Cartridge † 32K disc ‡ 48K disc
(Figures compiled by Calisto Computers Birmingham 021-632 6458)

ZX81*

1 (2) Fantasy Games (Psion)
2 (6) Space Raiders (Psion)
3 (1) Mothership (Sofsync)
4 (7) Scramble (Quicksilva)
5 (5) Flight Simulation (Psion)
6 (3) Invaders (Quicksilva)
7 (3) Space Raiders (Psion)
8 (4) Asteroids (Quicksilva)
9 (9) Defender (Quicksilva)
10 ( ) Chess (Psion)

* All 16K
(Figures compiled by Boots/Websters)

Vic 20

1 (1) Snooker (Visions)
2 (6) Krazy Kong (Interceptor)
3 (2) Flight 015 (Ferranti Davenport)
4 (–) Submarine Commander (Thorn/EMI)
5 (–) Escape MCP (Rabbit)
6 (8) Cosmic Attack (Rabbit)
7 (10) Dambuster (Rabbit)
8 (6) Jet Pac (Ultimate)
9 (7) Emmet Attack (Commodore)
10 (8) Grid Runner (Llamasoft)
10 (–) Mine Madness (Thorn/EMI)
(Figures compiled by Boots/Websters)

Dragon

1 (1) Dragon Chess (Oasis)
2 (3) Hungry Horace (Melbourne House)
3 (4) Chuckie Egg (A&F)
4 (2) Ugh! (Softek)
5 (6) Pedro (Imagine)
6 (–) Eightball (Microdeal)
7 (6) Kriegspiel (Beyond)
8 (–) Cuthbert in the Jungle (Microdeal)
9 (7) Up Periscope! (Beyond)
10 (–) Frogger (Microdeal)
10 (–) Scramble (Microdeal)
(Figures compiled by Boots/Websters)

Commodore 64

1 (2) Quick Thinking (Mirrorsoft)
2 (3) Caesar the Cat (Mirrorsoft)
3 (1) Manic Miner (Software Projects)
4 (3) Ugh! (Softek)
5 (4) Hunchback (Ocean)
6 (6) Mr Wimpy (Ocean)
7 (–) Spinnes and the Snowman (Commodore)
8 (8) International Football (Commodore)*
9 (5) Revenge of the Mutant Camels (Llamasoft)
10 ( ) Colossus Chess (CDS)

*Rom cartridge
(Figures compiled by Boots/Websters)

Books

1 (1) Disc Systems for the BBC Micro, *Sinclair* (Granada)
2 ( ) Commodore 64 Programmers Reference Guide *Commodore* (Commodore)
3 ( ) Mastering Machine Code on the ZX Spectrum *Baker* (Interface)
4 (3) Interfacing Projects for the BBC Micro *Smith* (Addison Wesley)
5 (–) Child's Guide to the BBC Micro *Dewhirst* (Cambridge)
6 (2) Mastering the Commodore 64 *Jones and Carpenter* (Hanover)
7 (8) 6809 Assembly Language Programming *Kane and Leventhal* (Osborne)
8 (7) Advanced Graphics with the BBC Microcomputer *Angell and Jones* (Macmillan)
9 (6) Introducing Logo, *Allan* (Granada)
10 (–) QL Companion *Allan* (Pitman)

(Figures compiled by Watford Technical Books Watford (0923) 33000 Prestel 39844)
(Last week's position in brackets)

Book Ends

SARCASTIC

One of the things kids who own micros often say to justify owning it is that they hope to get a job in computers and their micro will help them learn all about it

The correct response for the sarcastic and sadistic parent at this point is to say 'Ah it speaks *Cobol* does it' at which point kid looks confused and parents smile self-righteously

Because you see, *Cobol* is just about the business language at the moment but few micros speak it and learning *Basic* doesn't help much. For those people who are sincere in their intention to get a job in computing *Practical Cobol for Microcomputers* could be just the thing. This book discusses the language and includes a number of practical examples

As versions for the language do become widely available for micros, this book could prove very useful — *Cobol* is pretty much standardised, consequently most of the programs in the book should work on any version of it

Book	*Practical Cobol for Microcomputers*
Price	*£6 95*
Micro	*General*
Supplier	*Sigma Technical Press 5 Alton Road Wilmslow Cheshire SK9 5DY*

REFERENCE

Since one of the more sensible things you can do with your BBC is wordprocessing, a book on this subject is a fairly sound idea — hence *Word Processing on the BBC Micro*

Although the book hardly adds to the various manuals, it does usefully connect all the bits and pieces together. It can do this because it specifically assumes you are using *Wordwise* with an Epson printer — which is probably fairly likely. Thus, for example, you are shown exactly how to usefully implement control characters on the Epson from *Wordwise*. Good for quick reference

Book	*Word processing on the BBC Micro*
Price	*£5 25*
Micro	*BBC (+ Wordwise and Epson)*
Supplier	*The National Computing Centre Oxford Road Manchester M1 7ED*

This Week

Program	Type	Micro	Price	Supplier
Demolator	Arc	BBC	£8.95	Visions
Bedbugs	Arc	BBC/Electron	£8.95	Optima
Boxing/Galactica	Arc	Commodore 64	£5 95	I G Programs
Mastering the Commodore	Ed	Commodore 64	£5 95	Wiley
Multisound Synthesizer	Ut	Commodore 64	£14 95	Romik
Pettit	Arc	Commodore 64	£5 95	Romik
Spiral	Arc	Commodore 64	£5 95	Incentive
Turtle Jump	Arc	Commodore 64	£5 95	Romik
Gruneberg Spanish	Ed	Dragon	£12.99	Dragon Data
S 25	Ut	Dragon	£30.00	Ashby
Sealk Control	Ut	Dragon 32	£18.95	Aplives
CSS Forth	Ut	Lynx	£19 95	Cubsoft
Revenge of Droosph	Arc	Nascom	£8.50	G Rowland
Atlantis	Ad	Spectrum	£4.95	Oddyssey
Basic +	Ut	Spectrum	£12.95	Prosign
Craze	Ad	Spectrum	£3.50	Odyssey
Crusier	Ad	Spectrum	£3.50	Odyssey
Friendly Face	Ut	Spectrum	£5 95	Monitor
Golden Quest	Ad	Spectrum	£7.50	Marshallgate
It's the Woolul	Arc	Spectrum	£5.50	Crystal
Mugsy	Ad	Spectrum	£6 95	Melbourne House
Rubik	S	Spectrum	£2.95	Cheap Games
Safari	Ad	Spectrum	£3 90	Odyssey
Stronghold of Lori	Ad	Spectrum	£3.50	Odyssey
Temple of Vran	Ad	Spectrum	£7 50	Incentive
The Fall of Rome	S	Spectrum	£6.90	Argus
Time Search	Ad	Spectrum	£5 95	Millenium
Tomb of Rome	Ad	Spectrum	£4 95	Flashing Swords
Tradewind	Ad	Spectrum	£5 95	WD Software
Vari Calc	Ut	Spectrum	£4 90	G Deville
Chemistry A Level	Ed	Spectrum/BBC	£5 95	Calisto
Physics A Level	Ed	Spectrum/BBC	£5 95	Calisto
Horse Racing	S	TI99 4a	£5.95	C Flavell
Sonic Gold	Ad	Texas TI 99-4a	£5 95	Lizard
Lionel and the Lad	Arc	Texas TI 99-4a	£7.95	Intrigue
Mania	Ad	Texas TI 99 4a	£5 95	Intrigue
Postman's Knock	Arc	Texas TI 99/4a	£4 95	Lizard
26 Games	Arc	ZX81	£3.95	I Thomson

Key: Ad — adventure Arc — arcade Ed — education/ S — strategy-simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to This Week, Popular Computing Weekly 12-13 Little Newport Street, London WC2R 3LD

The outer limits

"The message is being repeated over and over I ll put it through the cabins speaker "

" May day may day is there anybody out there? This is the Folte of Falnon We are under attack in the name of the Emperor help us Forts One and Three are already down, we have suffered severe casualties they are closing for the kill At this point the message ended with a rising scream and the sound of air rushing into space As the poor men died he must have hit the repeat message control

"List our options Neep "

"We are marooned in this sector no habitable planets that we could reach within your life time travelling at subight You have supplies for approximately one year on board the Hawk Your only hope is to board Fort two and find the parts and expertise to fix the Hawk There is of course one small problem the alien fleet."

"The chances of destroying the fleet?"

"Small but not as bad as you may think I have set up a communication link with the central Pseudo Conscious Intelligent constructs surviving on Forts two and three They are both badly impaired but should be able to manouveur the Forts to give us some protection

"Well Neep the sooner we get this done, the happier I ll be Its been good knowing you!" I turned and waved at Neep one of his arms waved back With the Gravity Inertia Compensation damaged I felt my body thrown violently back into the seat as Neep accelerated the ship towards the Folts of Falnon I scanned the monitor screens in front of me — as I watched the first wave of Alien vessels appear at the top of the screen

"Put audio on online Neep Anything that might help predict their movements "

"There ain't much but I am picking up a fair amount of radio waves Converting to sound Aereus." The cabin was filled with the unearthly noise being generated by the monsters

I fired a shot up past Fort Two The Calunc Fire travelled upward into space, and a satisfying buzz came through the speakers as energy burnt off it. The display clearly showed the path of the fire — all the systems seemed to be working

Suddenly a curling cord of energy dropped from one of the aliens and blossomed into a feverish explosion on Fort three

'Final systems check, Neep Control to me on my mark Acknowledge "

"Systems functional safety devices over ridden overall ship status Amber 76 Control on your mark."

"Counting Five-Four-ThreeTwoOneMark Control to me " I grasped the joystick more firmly and sent the ship soaring across the inky blackness The aliens dropped steadily closer the atmosphere in the ship warmed the fire button became hot to the touch Neep whispered warnings and information into my ear Outside it looked as though a sun was being born, with deadly bands of energy ctis crossing in front of distant stars

The aliens went down, one by one in neat underwater explosions A command saucer appeared above the bulk of the alien fleet, glowing ultraviolet blue Swinging the Hawk round I fired The saucer dodged but too late A searing violet flame ripped across the fleet and four of the alien craft dissolved

With the Hawk pushed beyond its limits by Neep we were able to run around the alien ships and dodge their deadly coils of energy which sought to capture and destroy us The Folts Of Falnon were taking a terrible toll I only prayed that no one was near the outer skins

As the battle progressed, I felt myself becoming more and more detatched as though there were two of me one fighting the other watching as though the whole battle were just part of a space opera on 3D tv The watching part of me saw one of the alien craft shimmer and distort mutating through lethal unstable forms As it mutated deadly energies flew from it the watcher told the fighter who swung the Hawk round and fired

The watcher saw the final alien explode saw the fighters hands fall from the control console The watcher and the fighter closed their eyes

"Control to you Neep How s the ship?"

"Magnificent Aereus we still live The ship is in overall status Red 43 We have a few hours to secure the life support systems Imperative we approach the forts now **Mark Eyles**

Stage fright

Puzzle No 105

The Muddlecombe Players amateur dramatics scenery Department has just finished an extra couple of items needed for its next production These are a wooden rostrum and a plain wall flat

The rostrum consisted of a wooden framework cuboid in shape with each of the six rectangular faces covered with plywood The 'flat was just a plain rectangular structure one and a half times as high as it was wide

When these pieces were being painted it took the same quantity of paint to cover both items which was not surprising as the area of the six rectangular faces of the cuboid were together equal to the area of the one face of the flat

If the height width and length of the rostrum and the height and width of the flat were all an exact number of feet with no two dimensions being the same what was the smallest size possible for both items?

Solution to Puzzle No 100

The problem relates to finding any integral factors of 1111111 The program divides this sum by successive odd numbers until an exact division is found

10 LET D = 3 20 LET C 1111111/D 30 IF C = INT C THEN GOTO 60 40 D = D + 2 50 GOTO 30 60 PRINT D C

Both of these numbers represent the two prime factors of 1111111 and so there can be no ambiguity in the answer of 4649 television sets at £239 each

Winner of Puzzle No 100

The winner is Graham Maguire Kepler Street Seaforth Liverpool who receives £10

Rules

If the puzzle can be sensibly solved using a computer then the winner will have included a listing of the program used to find the correct answer

The closing date for entries to Puzzle No 105 is May 18

The Hackers

but seriously

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A SAD BUT BUSY DAY AT **CHEZ PI** AS UNCLE GROUCHO PREPARES TO RETURN TO HIS HOMELAND. THIS COULD BE A **THREE-HANKIE** JOB, DEPENDING HOW MUCH OF YOUR **TEA** YOU SLOP DOWN YOUR FRONT WHILST READING..

CRUMBS, GROUCH, YOU HAVEN'T HALF COLLECTED SOME OLD CODSWALLOP!

OKAY–I'LL JUST TAKE THE **WALLOP**. YOU CAN KEEP THE **OLD CODS**.

CANDLE WITH HANDLE!

HELLO, PINKY! CAN I HAVE YOUR AUTOGRAPH?

ERK

HEY, I THOUGHT I TOLD YOU TO STAY PUT UNTIL WE GOT UNDERWAY?!

I'M NOT GOING WITH YOU UNLESS THE PIMAN SIGNS MY RIGHT LEG, ABOVE THE KNEE!

LUCKY I HAD MY **PIRO** HANDY!

HEAVENS ABOVE!

I'D BETTER NOT WRITE **THAT**!

SOUTHAMPTON DOCKS AND GROUCHO'S BIG SEND OFF..

♫ HELLO, I MUST BE GOING ♫ I CANNOT STAY, I CAME TO SAY I MUST BE GOING..

LEGSAN ARMS

OH, GROUCHO IT WON'T BE THE SAME WITHOUT THAT HAZE OF ASPHYXIATING CIGAR SMOKE! SOB!

DON'T CALL ME THAT

YEAH, PAL. DON'T FORGET TO WRITE .. OH -AND I'VE MADE UP A POEM!

FAREWELL UNCLE GROUCHO FROM PIMAN & FROM TOOTS, YOU LEAVE BEHIND YOUR PROGRAM... AVAILABLE FROM BOOTS, AVAILABLE MAIL ORDER, OR FROM YOUR SOFTWARE STORE, CLOSING DATE IS JUNE 1ST, I CAN'T NOT WRITE NO MORE, WAAAH!

GROUCHO– WHERE IS HE?!

LOOK–A COMPETITION!

GROUCHO! WHAT ARE YOU DOING? WHY AREN'T YOU ON THE **QE2?**

BECAUSE I SPENT THE FARE!

BUT YOU CAN'T ROW TO AMERICA!

NO

THAT'S WHY I BROUGHT DOROTHY ALONG! BEGOOD!